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# **GUN DRILL**

**FOR**

**QF 25-PR GUN, MARKS 2/1, 3/1 AND 4**

**ON**

**CARRIAGE 25-PR, MARKS 1 AND 3**

**1956**

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*By Command of the Army Council,*

*E. W. Playfair*

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## PAMPHLET REFERENCES

References are made in the text to the following publications by using the abbreviations shown below:—

Artillery Training, Volume III, Pamphlet No. 1 1948 (WO Code No. 8367).	AT III, 1/48
Artillery Training, Volume III, Pamphlet No. 2 1956 (WO Code No. 9059).	AT III, 2/56
Artillery Training, Volume III, Pamphlet No. 3 1956 (WO Code No. 9060).	AT III, 3/56
Directions for the Use of Artillery Instruments, Pamphlet No. 6 1956 (WO Code No. 9088).	DUAL, 6/56

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RESTRICTED

# **GUN DRILL**

FOR

**QF 25-PR GUN, MARKS 2/1, 3/1 AND 4**

ON

**CARRIAGE 25-PR, MARKS 1 AND 3**

## **CHAPTER 1**

### **GENERAL DUTIES**

#### **SECTION 1.—INTRODUCTION**

1. This pamphlet is written for the guidance of Nos. 1 and instructors. The duties of the GPO and section commanders are given in AT III, and are not described in this Gun Drill unless a description is necessary for the understanding of the duties of the detachment.

2. The servicing which is part of the drill of the detachment is described in Chapters 6 and 7. For a general description of the gun, trailer and ammunition, together with full details of routine servicing and the action of all working parts, reference should be made to the "User Handbook".

3. The following summary of principal duties is not a comprehensive list, but is intended as a guide to Nos. 1 and instructors, and as a simple index to the detailed drill given in subsequent chapters.

The duties of the detachment during the engagement of tanks are described in Chapter 3.

## SECTION 2.—DUTIES OF 1

4. 1 is in command of the detachment and is responsible for the entire service of the gun. Normally he acts directly on the orders of the GPO, but during the engagement of tanks he is responsible for fire control after the GPO has ordered "**engage**".

Chap 2.

5. During programme shoots 1 controls the fire of his gun in accordance with the written detail of the gun programme, but acts immediately on any verbal orders from the GPO.

Chap 3.

6. 1 is responsible that his equipment is in all respects serviceable. He will make members of the detachment responsible to him for the completeness and serviceability of the parts and stores which they examine at examination of equipment.

Sec 15, Chaps 6 and 7.

7. He is responsible that his gun is at all times laid at the correct line and elevation and for checking that fuze length and charge are correct before loading.

Sec 92.

Secs 19 to 26.  
Sec 30, Chap 4.

8. He supervises the preparation and supply of ammunition and reports any unserviceable ammunition to the GPO.

Chap 5.

9. He orders the gun to be loaded and fired. Secs 28 and 31.

10. He is responsible that the maximum protection is provided for his detachment, consistent with efficient service of the gun. Appx II.

11. During firing he watches the action of the recoil mechanism and corrects any faults. Chap 7.

12. During pauses in firing he supervises the servicing of the equipment and directs the clearing up and collection of salvage. Chap 7.

13. He arranges reliefs. He may order any numbers to "Rest" if he considers that the service of the gun can be maintained without them.

14. He is responsible for the following miscellaneous details:—

- (a) Arranging camouflage as ordered by the GPO.
- (b) Recording details of the ammunition fired in each series.

### SECTION 3.—DUTIES OF 2

15. 2 operates the breech. Secs 9, 28, 29, 31 and 32.

16. He rams the shell. Para 98.

17. He operates the safety catch. Secs 39, 42 and Para 127.

18. During firing, he cleans and lightly oils the breech and firing mechanism as opportunity offers. Chap 7.

19. He operates the brake, and is responsible that it is off before travelling.

20. He operates the gun rule when in use. Sec 69.

#### SECTION 4.—DUTIES OF 3

21. 3 is responsible for sight setting and laying. Chap 4 Secs 19 to 26; 30, 34 and 35.

22. He fires the gun. Sec 31.

23. He is responsible that the cradle is clamped before travelling. Secs 8, 15 and 45.

#### SECTION 5.—DUTIES OF 4

24. 4 is responsible for loading the shell and the cartridge. Throughout a shoot, as soon as the ammunition has been ordered, he will always have a shell ready to load. He is normally supplied by 5 but he will help with the preparation of ammunition whenever possible and will obtain ammunition himself if there is any delay in the service by 5. Sec 28.

25. He is responsible that the shell and fuze are serviceable and that the fuze is not knocked against any part of the equipment during loading.

Chap 5.

26. He is responsible for planting the aiming posts and setting up the paralleloscope.

Secs 23 and 24.

## SECTION 6.—DUTIES OF 5 AND 6

27. 5 and 6 are responsible for the preparation and supply of ammunition. They ensure that shell and cartridges are kept clean and protected from damp and extremes of temperature. They sort ammunition into groups.

Chap 5.

28. 5 ensures that the cartridges used during any one shoot are all of one nature of propellant, and so far as is possible are of one propellant lot number. 5 operates the fuze setter hand when in use.

Para 258.

29. 6 operates the fuze indicator when in use.

Sec 68.

30. 6 is responsible that the hand brake at the left of the trailer is off before travelling.

If the tractor is to be reversed when the trailer is hooked in, 6 is responsible that the backing stop is lowered. He is responsible for raising, *ie*, releasing, the backing stop before travelling.

When the trailer is to be manhandled 6 releases the over-run brakes, if on, by raising the brake release lever.

## CHAPTER 2

### GUN DRILL

#### SECTION 7.—INTRODUCTION

31. For the convenience of instructors and Nos. 1, explanatory notes are given at the beginning of certain sections of this and subsequent chapters. During training, the content of these notes should be explained indoors or informally round the gun before instruction in the drill is begun. Before beginning instruction in gun drill, the instructor should ensure that the detachments are familiar with the names of the relevant parts of the equipment and understand how they are to be operated.

Drill with reduced detachments should be practised as soon as detachments are proficient in the normal drill. In the later stages of training, drill with reduced detachments should be regarded as normal rather than exceptional (para 13 and Sec 46).

#### Definitions

32. When the gun is hooked in to the trailer or tractor, or when the gun has just been unhooked but the trail not yet lowered to the ground, the term "front" means the direction in which the trailer or tractor is pointing.

When the trail is on the ground, the term "front" means the direction in which the muzzle is pointing.

The terms "right", "left" and "rear" are always used in relation to "front" as defined above.

## SECTION 8.—TO CLAMP AND UNCLAMP THE CRADLE

### Notes

33. In order to avoid damage to the elevating and traversing gears, the cradle must always be clamped before travelling.

### Drill

34. *To clamp the cradle.*—3 depresses the gun. 2 swings the cradle clamp into the travelling position and ensures that it is locked in place.

3 traverses the gun to the right, elevates until the clamp bracket of the cradle bears on the clamp and then traverses to zero.

35. *To unclamp the cradle.*—3 eases the elevating and traversing gears. 2 pushes the release lever to the left, swings the cradle clamp to the rear and secures it in the housing bracket.

## SECTION 9.—TO OPEN AND CLOSE THE BREECH

### Notes

36. The breech mechanism lever is held in the fully closed position by a catch which is released by pushing the actuating lever to the rear.

The breech block is held in the fully open position against the action of the buffer spring by the lugs of the extractor levers which engage in recesses in the breech block. When a cartridge is loaded, its rim carries the extractors forward, thus releasing the breech block, which is then partially raised by the buffer spring.

When the breech is to be closed without loading a cartridge, the extractors must first be pushed forward with the base of a drill cartridge or with the forefinger and thumb of the left hand. In the latter case, the breech mechanism lever should be held down against the buffer spring with the right hand and then raised gently when the extractors have been pushed forward.

### **Drill**

37. *To open the breech.*—2 strikes the actuating lever with the palm of his right hand, thus forcing the breech mechanism lever to the rear and down.

38. *To close the breech.*—2 pulls up lightly on the breech mechanism lever with his right hand while 4 loads the cartridge. As soon as 2 feels the breech mechanism lever free to move, he pulls it sharply upward and forward into the fully closed position.

### **SECTION 10.—TO FORM DETACHMENT REAR (or FRONT)**

39. On the order "**Detachment rear (or front)**", the detachment fall in in two ranks, 1, 3, 5 and 6 from right to left in the front rank, 2 and 4 in the rear rank covering 3 and 5 respectively, with one pace between the ranks. They dress by the right and stand at ease.

With only four men, 4 falls in in the place normally occupied by 5.

At detachment rear when the gun is hooked in, the front rank is three paces in rear of the muzzle and 1 covers the right gun wheel.

At detachment rear when the gun is in action, the front rank is one pace in rear of the trail eye and 1 covers the right gun wheel.

At detachment front, the front rank is three paces in front of the tractor and 1 is in front of the right tractor wheel.

The drivers, if present, fall in on the right of their vehicles in line with their doors.

## SECTION 11.—TO TELL OFF

40. On the order "**Tell-off**", the detachment number as follows:—

1 numbers himself 1, the right-hand man of the rear rank 2, his front rank man 3, and so on.

## SECTION 12.—TO CHANGE ROUND

41. On the order "**Change-round**", 1 takes a pace to the left rear and then a pace to the left. The left-hand man of the rear rank takes a pace to the left and then a pace to the left front.

At the same time, the remainder of the front rank take two short paces to the right and the remainder of the rear rank take two short paces to the left.

When the detachment consists of five men, 4 takes two short paces to the front.

## SECTION 13.—TO MOVE THE GUN AND TRAILER

## Notes

42. The drill described below is used for moving the gun and trailer on firm, level ground, *eg*, on gun drill parades. On uneven ground, the methods described under man-handling should be used in preference to an attempt to move the gun by drill methods.

The order "**Without dragropes prepare to advance (or retire)**" will normally be given when the detachments are at attention in their positions at detachment rear.

If, after the gun has been moved to the front (or rear), it is desired to move it in the opposite direction, the orders "**Halt**" and "**Prepare to retire (or advance)**" are given.

The order to move the gun is "**Walk-march**". The term "**walk-march**" is used to indicate that there is no attempt to keep in step. The gun is moved as

follows, 2 and 3 pushing (or pulling) on the shield, 4 pushing on the muzzle (or breech), 5 and 6 pushing on the lifting handles of the trailer perch.

## Drill

43. On the order "**Without dragropes, prepare to advance**", the detachment double to their positions, 1, 3 and 5 going by the right of the equipment, 2 and 6 by the left, and 4 by the shortest route. 5 and 6 open the lifting handles of the trailer perch and raise the perch. The detachment stand at attention facing the front, in the following positions, even numbers on the left and odd numbers on the right:—

1 where he can best supervise the movement, normally beside 5 at the trailer perch.

2 and 3 in rear of the shield.

4 in rear of the muzzle.

5 and 6 at the trailer perch.

44. On the order "**Walk-march**", 2 takes off the brake and the detachment move the gun as directed by 1.

On the order "**Halt**", 2 puts on the brake, and the detachment halt the equipment and stand at attention.

On the order "**Detachment rear**" 5 and 6 lower the trailer perch gently to the ground and close the lifting handles. The detachment double to their places at detachment rear.

45. On the order "**Without dragropes, prepare to retire**", the detachment act as already detailed except that all numbers face the rear and 4 stands beside the trail, ready to push at the breech.

On the order "**Prepare to retire**" (when the detachment are facing the front) or "**Prepare to advance**" (when the detachment are facing the rear), 1, 2 and 3 turn inwards about. 4 doubles from the muzzle to the breech or vice versa. 5 and 6 move round the lifting handles.

## SECTION 14.—TO MOUNT AND DISMOUNT

46. On the order "**Mount**", the detachment double to their tractors and mount as follows:—

### *Gun tractor*

Right side .. .. Driver (if dismounted) and  
3.  
Left side .. .. 4, 2 and 1.

### *Section ammunition tractor*

Right side .. .. Driver (if dismounted) and  
5 of each detachment.  
Left side .. .. 6 of each detachment.

47. On the order "**Dismount**", the detachment dismount and take up their positions at detachment rear.

## SECTION 15.—TO PREPARE FOR ACTION

### Notes

48. The troop leader will normally order preparation for action to be carried out shortly before the guns move into action. The aim is to ensure that the equipment is in all respects ready for action.

If time permits, and if the move into action is expected to be short, the troop leader will normally order the quick sight tests to be carried out at the same time.

The troop leader may order covers to be left off if he is satisfied that there is no danger from dust or grit, and that the move into action will be short. When covers are ordered to be left off, they will be strapped to the trail and the cross levelling gear will be left approximately central. Otherwise the cross levelling gear will be screwed home before the sight cover is replaced.

Tests have proved that foreign matter liable to cause prematures can become lodged in the muzzle brake and be invisible from the breech end. 1 will, therefore, frequently examine the muzzle brake when in action to ensure that it is free from foreign matter, including water and ice.

## Drill

49. On the order "**Prepare for action**", 2 and 3 go to the lifting handles of the trail, 3 releases the catch of the trailer hook and with 2 lifts the trail eye clear of the hook. 2 and 3 pull the trail to one side and lower it gently to the ground.

The detachment take off the gun and carriage cover, if fitted, 2 and 3 working at the breech and 4, 5 and 6 at the muzzle.

1 examines the muzzle brake. He ensures that the bore is clear and that the detachment and equipment are in all respects ready for action.

2 and 3 release and fold back the cradle clamp and 3 depresses the gun. They examine the cradle clamping gear, the platform, the platform clamping levers and the shield.

2 removes the breech and muzzle covers and places them on the trail. He places the dial sight in its socket, opens the breech and examines the breech mechanism, rammer, cocking lanyard and brake. He examines the gun rule, if provided. He closes the breech after 1 has inspected the bore.

3 removes the sight cover and places it on the trail. He fixes and examines the dial sight and sight clinometer. He examines the elevating, traversing, cross-leveiling and range scale gears. He fixes and examines the sighting telescope. He examines the open sight and the sight port cover and then unclamps the dial sight.

2 and 3 test the firing gear, 2 easing the striker forward while 3 pulls the firing lever. 2 removes the dial sight from its socket and replaces it in its case. He then fixes the cradle clamp. 3 replaces the sighting telescope and sight clinometer in their cases and clamps the cradle.

If the troop leader has ordered "**Covers off**", 2 straps the breech, muzzle and sight covers to the trail. Otherwise he replaces the breech and muzzle covers,

while 3 sets the range scale gear at stops, screws the cross levelling gear home and replaces the sight cover.

4 examines the paralleloscope, gun trailer, spade box, handspikes, fuze keys, aiming posts and dragropes.

5 and 6 examine the section ammunition trailers.

4, 5 and 6 examine, and if necessary, sort ammunition and record the number of rounds by types.

5 examines the fuze setter hand.

6 examines the fuze indicator.

As soon as the examination is complete, 1 orders "**Limber up**". 2 and 3 raise the trail and assisted by the remainder of the detachment place the trail eye on the trailer hook. 1 ensures that the firing platform is securely clamped.

The detachment take up their positions at detachment rear unless otherwise ordered. 1 collects reports and doubles to the troop leader to report his gun ready for action, the deficiencies, if any, and the ammunition state.

## SECTION 16.—TO COME INTO ACTION

### Notes

50. If the troop is brought into action as a whole, the order (or signal) "**Action**" will be given as the guns approach the selected position. The gun positions will normally have been marked by flags or markers, and 1 is responsible that the gun is brought into action as close as possible to his marker. When positions are not marked, the responsibility for the choice of the platform rests with 1.

51. If the position is to be occupied by the independent method, the guns will have been halted under cover close to the gun position and Nos. 1 (and possibly Nos. 3) will have been taken to the gun position. Nos. 1 will have been shown their gun positions, and will have reconnoitred the route to them. Nos. 1 will then lead their guns into action as ordered by the GPO.

52. Unless otherwise ordered by the GPO, the trailer will normally be placed at the left of the gun in order to give the maximum protection to the detachment and to be convenient for the service of ammunition.

The trailer must not interfere with the traversing or the field of fire of any gun. The GPO will therefore order the trailers of flank guns to be placed on the inner flank if he considers that there is any possibility of attack by tanks.

53. Although equipments are designed to withstand hard usage under service conditions, the risk of damage can be greatly reduced, without any loss of efficiency, by the exercise of care by the driver and the detachment.

Particular care is necessary when using the tractor to pull the gun on to its platform.

54. In order to avoid risk of accidents, it is forbidden to walk backwards when carrying the trail.

55. On drill parades, when no towing vehicles are available, the drill should be carried out in stages, and "tractors" should be improvised by using alternate detachments to pull the neighbouring guns on to their platforms, thus allowing the actual gun detachment to perform their normal duties as described below.

56. When detailing the drill for action left, front, or rear, the instructor will give the complete detail, modifying the drill of paras 59 and 60 as follows:—

(a) At "**Action left**" or "**Action front**", unless otherwise ordered, the trail is carried to the right through a quarter or a half circle respectively, and 3 moves round the trail in order to avoid walking backward. If the gun is on a side slope, 1 may order the trail to be carried round by the downhill side if this is considered more convenient.

(b) At "**Action rear**", the trail is lowered gently to the ground as soon as the trailer is clear.

57. The drill for coming into action and firing the gun without the platform is described in Sec 48.

58. The following signals are used by the troop leader and by Nos. 1 for controlling the movement of vehicles when coming into and going out of action. By night, voice control is the simplest method.

**"Action"**—Hands clenched and arms extended straight to the front of the body, facing the required line of fire.

**"Halt"**—Arm raised vertically above the head.

**"Advance"**—1 faces the driver and beckons him to advance by extending the right arm to the front of the body and bringing the hand upwards and towards the face, bending the arm at the elbow.

**"Reverse"**—1 extends both arms to the front, elbows bent and palms of the hands upright and towards the driver. He moves the forearms backwards and forwards as long as the reverse movement is required.

**"Change direction"**—1 extends one arm with fist clenched, in line with the shoulder in the direction in which the vehicle is to move.

## Drill

59. Having received the order (or signal) **"Action right"**, 1 dismounts on approaching his position. He stands where he can see when his gun is in the required position and where he can signal to the driver when the gun and later the trailer are disconnected.

When the gun is in the required position, 1 signals to the driver to halt and orders **"Action right"**.

The detachment dismounts.

2, 3, 4 and 5 go to the platform, even numbers on the left, odd on the right, 2 and 3 nearest the breech. 2 and 5 release the clamping levers and, assisted by 3 and 4, lift the platform hooks clear of the chains and lower the platform to the ground. The detachment stand clear.

1 signals "**Advance**". The driver drives carefully forward one yard, to pull the gun on to the platform.

2 and 3 lock the platform stays and then go to the lifting handles of the trail. 3 releases the catch of the trailer hook and, with 2, lifts the trail eye clear of the hook. 3 signals "**Clear**" to 1 by raising his hand above his head.

1 signals "**Advance**". The driver drives forward two yards and halts. 2 moves round the trail eye, and with 3 carries the trail through a quarter circle to the left. 2 and 3 lower the trail gently to the ground.

4, 5 and 6 go to the trailer, 5 and 6 at the perch and 4 at the brake. 5 and 6 open the lifting handles. 5 releases the catch of the towing hook, and with 6 lifts the perch eye clear of the hook. 5 signals "**Clear**" to 1 by raising his hand above his head.

1 signals "**Advance**". The driver drives forward two yards and halts. 5 and 6 lower the perch gently to the ground. 4, 5 and 6 unload stores and ammunition from the tractor as necessary.

1 then orders the tractor to proceed to the wagon lines under the direction of the troop BSM.

60. As soon as each member of the detachment has finished his duties as already described, he carries out the following detail:—

1 examines the muzzle brake and ensures that the bore is clear. He places a handspike in the centre socket of the trail and selects GAPs 1 and 2.

With the Mark 3 carriage, he pulls out the retaining plunger and raises the trail eye to the firing position.

2 and 3 release and fold back the cradle clamp.  
3 depresses the gun.

2 removes the breech and muzzle covers, if fitted, and places them on the trail. He places the dial sight in its socket, opens the breech and obtains the rammer and cocking lanyard.

**3** removes the sight cover, if fitted, and places it on the trail. He fixes the dial sight and sight clinometer and sets the latter to zero. He sets the range scale plate at 10 degrees and brings the bubble of the sight clinometer to the centre of its run by means of the elevating handwheel. He cross-levels the sight and fixes the sighting telescope.

The detachment man-handle the trailer into the position ordered by **1**.

**2** straps all covers to the trail and places the gun rule in a convenient position.

**4, 5** and **6** obtain fuze keys and fuze setter.

**6** places the fuze indicator in a convenient position.

**5** and **6** open the trailer doors and prepare ammunition.

**6** runs out the tannoy cable to the command post and **1** connects the tannoy.

The detachment take up their positions in action.

## SECTION 17.—POSITIONS IN ACTION

**61. 1** kneels at the right of the traversing handspike, clear of the spade.

**2** kneels at the right of the trail, close to and facing the breech.

**3** sits on the layer's seat.

**4** kneels at the left of the trail, close to and facing the breech.

**5** and **6** kneel in convenient positions for supplying ammunition, with **5** nearer the gun.

The detachment stand up as required in order to perform their duties.

## SECTION 18.—PASSAGE OF ORDERS

## Notes

62. The guns in action are numbered 1, 2, 3 and 4 from right to left. In case of doubt, owing to staggered siting, the GPO will allot numbers. In all cases these numbers stand throughout the action, irrespective of the line in which the guns are laid.

Orders will normally be passed and acknowledged through the tannoy system. If the tannoy system fails, orders will be passed by voice and acknowledged as follows:—

- (a) *By Nos. 1 visible from the command post.*—By raising one hand vertically above the head.
- (b) *By Nos. 1 invisible from the command post.*—By reporting in succession from the right “No. . . through”.

When orders are being passed by voice, each No. 1 will look towards the next No. 1 on the side away from the command post (with the exception of the No. 1 furthest from the command post, who will look towards the remaining guns) and will repeat any order which is not immediately acknowledged. If the No. 1 still fails to acknowledge the order it will be repeated by the GPO.

Repetition of an order will be demanded, or attention will be called to omissions or obvious verbal slips by the use of “**Check . .**” *eg*, “**Check elevation**”.

Nos. 1 will repeat orders affecting their detachments in a voice no louder than is necessary and only when the order has not been heard by the men concerned or when specially detailed in this Gun Drill.

Reports from Nos. 1 to the GPO will be acknowledged by the GPO raising one hand vertically above the head, or for Nos. 1 reporting “**.. Ready**”, by ordering “**Down . .**” (Number of gun(s)). Orders from the GPO always take precedence over reports from Nos. 1.

## SECTION 19.—TO LAY THE GUN IN THE CENTRE OF ARC

### Notes

63. During training, before detailing the drill of this and subsequent sections, the instructor will ensure that men who are to perform the duties of 1 and 3 are familiar with the drill for sight setting and laying as detailed in Chapter 4.

64. The GPO is responsible that the original line of fire of all guns is in the direction ordered. This direction is known as the centre of arc.

65. When the individual angle method is to be used, and if the passage of orders by voice is likely to be difficult, the GPO will either:—

(a) *Order runners to be sent from each detachment to the director.*—The drill will be as described in para 67 except that all orders and reports will be written and Nos. 1 will not call back the angles to the GPO.

or

(b) *Pass the angles to the guns through the tannoy system.*—The drill will be as described in para 67, the Nos. 1 calling the angles back to the GPO through the tannoy.

66. When the individual angle method has been used and if time permits, the GPO will repeat his measurement of the angle to each dial sight before ordering "**Record as bearing . . . degrees**" and after the No. 1 has reported "**No. . . . finished with director**". This repetition will eliminate errors due to the movement of the dial sight during laying. If the GPO finds that the original angle remains correct, he will notify this fact to the No. 1 by ordering "**No. . . . record as bearing . . . degrees**". If a fresh angle is required, the GPO will order the fresh angle and the drill as detailed in para 67 will be repeated.

**Drill.—Individual angle method**

67. On the order from the GPO:—

**“Aiming point—director”.**

**“No. . . degrees . . minutes”.**

1 repeats back to the GPO the angle ordered. If the repetition is correct, the GPO acknowledges.

If the repetition is incorrect, the GPO orders the correct angle again.

3 sets the main scale of the dial sight as ordered and 1 checks the setting. 1 mans the traversing handspike.

3 directs the movement of the trail until the gun is laid roughly for line. 2 puts on the brake. 3 lays on the director.

When the gun is laid, 1 reports to the GPO **“No. . . finished with director”**.

**Drill.—Aiming point method**

68. On order from the GPO:—

**“Aiming—point”.**

1 doubles to the GPO who indicates the troop aiming point. 1 then doubles back to his gun.

6 mans the traversing handspike.

The GPO orders the angle from the aiming point:—

**GPO—“ . . degrees . . minutes”.**

3 sets the main scale at the angle ordered.

1 checks the setting.

1 directs the movement of the trail until the gun is laid roughly for line. 2 puts on the brake. 6 takes up his position in action. 1 lays on the aiming point.

## SECTION 20.—TO RECORD CENTRE OF ARC

## Notes

69. The GPO will order the original line of fire to be recorded as the centre of arc. Two independent records will be made on the centre of arc reading plate as follows:—

(a) A record of the main scale reading to GAP 1.

(b) A record of the main scale reading to GAP 2, or to an alternative "aiming point" ordered by the GPO, *eg*, aiming posts, paralleloscopes or troop picket.

The choice of GAPs 1 and 2 is described in Sec 59.

70. As soon as centre of arc has been recorded by both methods, 1 will report to the GPO "**No. . . . bearing . . . degrees recorded**".

If fire orders are received before the centre of arc has been recorded, the GPO will normally order "**Defer second method**". 1 will then report "**No. . . . bearing . . . degrees recorded**" as soon as the main scale reading to GAP 1 has been recorded and checked. When the making of a second centre of arc record has been deferred in this way, 1 will complete the second record at the earliest opportunity and without further orders from the GPO.

71. At the first opportunity after the centre of arc has been recorded, 1 will direct the planting of a marker in the centre of arc in front of his gun as an aid to the measuring of bearings and as a means of checking that the gun is at all times laid in the correct line. He will also point out GAPs 1 and 2 and his centre of arc marker to all members of his detachment.

72. The records of the centre of arc will stand until cancelled by a subsequent order from the GPO "**Record as bearing . . . degrees**". Upon this order 1 will order the previous records to be erased and the drill of para 75 will be carried out with the gun laid in the fresh line ordered.

If aiming posts are in use, the GPO may order **"Replant aiming posts . . degrees"**, or, if they are no longer required, **"In aiming posts"**.

73. During the laying of the gun in the original line and the recording of centre of arc, the cross-level bubble and the sight clinometer bubble must both be in the centre of their runs and the sight clinometer must be set at zero. The settings of the drift scale plate, the range scale plate, and the cowl of the dial sight do not affect the accuracy of the centre of arc record, but for convenience the TE Scale should be set to 10 degrees.

74. The drill described in para 75 is for the case when GAPs 1 and 2 are used.

When **"Record as bearing . . . degrees—troop picket"** is ordered, the drill is the same, except that the troop picket is used as GAP 2.

When **"Record as bearing . . . degrees—aiming posts . . . degrees"** is ordered the drill for GAP 1 is the same, the aiming posts are then planted as described in Sec 23, and the drill is completed using the aiming posts as GAP 2.

When **"Record as bearing . . . degrees—paralleloscopes"** is ordered, the drill for GAP 1 is the same, the paralleloscope is then set up as described in Sec 24, and the drill is completed, using the paralleloscope as GAP 2.

In no circumstances will a No. 1 amend his centre of arc record without orders from the GPO. Should it be obvious to a No. 1 that his original centre of arc record was wrong, he will report the fact to the GPO who will arrange for a check and will, if necessary, order a fresh record to be made.

### **Drill**

75. On the order **"Record as bearing . . . degrees"**, 1 records the bearing ordered on the reading plate. As soon as the gun is laid in the line to be recorded. 1 turns the dial sight on to his selected GAP 1.

3 identifies GAP 1 by looking through and over the dial sight, reads the main scale and records the reading on the record plate.

While 3 is recording this angle, 1 slips the slipping scale to the bearing ordered and checks that the dial sight is still laid on GAP 1. He then reads the main scale, checks 3's record and turns the dial sight on to his selected GAP 2.

3 identifies GAP 2 by looking through and over the dial sight, reads the main scale and records the reading on the plate.

1 reads the main scale, checks 3's records and reports to the GPO "No. . . . bearing . . . degrees recorded".

3 turns the dial sight back on to GAP 1.

2 and 3 raise and lock the shield flap, provided that it does not obscure GAP 1.

2 takes off the brake.

## SECTION 21.—TO RECORD FRESH CENTRE OF ARC

### Notes

76. When the bearing of the original line in which the guns are laid is altered, eg, due to a change of orientation when changing from one grid to another, the change will be ordered by the GPO as follows:—

**"Bearing . . . . . degrees . . . . . minutes. Angle of sight zero. Record as bearing . . . degrees".**

### Drill

77. On the order from the GPO

**"Bearing . . . . . degrees . . . . . minutes".**

**"Angle of sight zero".**

**"Record as bearing . . . . . degrees".**

3 sets the slipping scale of the dial sight as ordered, sets the sight clinometer as ordered and relays on the GAP in use with the traversing gear to centre.

1 checks the lay.

3 erases the current data from the centre of arc reading plate.

The drill detailed in Section 20 is then carried out.

## SECTION 22.—TO RECORD NIGHT CENTRE OF ARC

### Notes

78. The means of laying by night are troop pickets, aiming posts or paralleloscopes. The order of preference of these methods is set out in AT III, 3/56, Sec 13.

When ordering night centre of arc to be recorded, the GPO names the methods to be employed, the first named being used for laying from round to round, and the second as the alternative record.

79. On the order "**Record as night bearing . . . degrees . . . and . . .**", the drill is as described in Sec 20 except that day centre of arc records are not erased. When both night records have been made, 1, reports to the GPO "**No. . . . night bearing . . . degrees recorded**".

## SECTION 23.—TO PLANT AIMING POSTS

### Notes

80. Aiming posts may be planted for one of the following purposes:—

- (a) *For use as an alternative method of recording the centre of arc.*—In order to reduce the danger of the aiming posts becoming obscured by the muzzle, it is generally desirable to plant the aiming posts to the left of the centre of arc or in rear. The order is "**Record as bearing . . . degrees. Aiming posts . . . degrees**".

In order to reduce risk of confusion it may be desirable to plant aiming posts alternately in front and in rear. The order is **"Record as bearing . . . degrees. Aiming posts, one and three . . . degrees, two and four . . . degrees"**.

The drill to be used when aiming posts are planted for this purpose is described in para 82.

- (b) *For marking the current line of fire, not necessarily the centre of arc.*—The guns having been laid at the required bearing, the order is **"Aiming posts 180 (or 360) degrees"**.

The drill when aiming posts are planted for this purpose is as described in para 82 with the exception that no records are made of the main scale reading and the dial sight is left laid on the aiming posts.

Nos. 4 should be trained to plant aiming posts within two or three degrees of the angle ordered.

The drill for laying by aiming posts is described in Chapter 4.

81. The following table shows the signals used by 3 with their meanings and the action to be taken by 4.

Order and signal	Action by 4
<b>"Move in direction indicated"</b> —Right arm extended upwards to the right, or left arm extended upwards to the left, palm of the hand in the direction required.	He holds the post upright, clear of his body and moves in the direction indicated, continuing to move steadily until the halt signal is given.

**"Halt"**—Arm dropped.

He halts and allows the post to slip through his fingers until the point rests on the ground.

**"Plant"**—Both arms dropped from above the head.

He presses the point firmly into the ground with his foot, or hammers it in if the ground is hard. He ensures that the post is upright and then steps clear.

**"Move head of post in direction indicated"**—Both arms extended above the head and moved laterally in the direction required.

He moves the head of the post in the direction indicated, continuing until the plant signal is given. He ensures that the post is firmly planted and then steps clear.

**"Pick up"**—Both arms extended to the front and raised upwards, palms of the hands upwards.

He pulls the post out of the ground and awaits further signals.

**"Raise or lower crosshead"**—Upward or downward movement of the arms, with both arms extended laterally.

He moves the crosshead as indicated, continuing to move steadily until the clamp signal is given.

**"Clamp crosshead"**—Both arms dropped from above the head.

He clamps the crosshead ensuring that it is as nearly as he can judge at right angles to the line from the aiming post to the gun.

**"Come in"**—Body turned in the direction required. Both arms extended above the head and lowered in the direction required.

When at the further post, he doubles to the nearer post and awaits signals. When at the nearer post, he doubles in to his position in action.

## Drill.

82. On the order "**Record as bearing . . . degrees. Aiming post . . . degrees**", 4 obtains the aiming posts and doubles to a position about 50 yards in front of the gun in accordance with the angle ordered, and as nearly as he can judge in the line indicated. He plants the first aiming post and opens the crosshead. He doubles on a further 50 yards with the second, lines it up with the dial sight and the near aiming post, and opens the crosshead.

When the gun is laid in the required line, and GAP 1 recorded, 3 sets the main scale approximately at the angle ordered. As soon as 4 has planted the near aiming post 3 turns the dial sight accurately on to it. 3 then directs the planting of the farther aiming post exactly in line with the near one and the positioning of the crosshead so that it is visible and as low as possible.

3 signals 4 to come in to the near aiming post, and to position the crosshead so that one crosshead is just visible over the top of the other. He then signals 4 to come in.

3 and 1 then complete the drill for recording centre of arc, using the aiming posts as GAP 2.

## SECTION 24.—TO SET UP THE PARALLELOSCOPE

### Notes

83. The paralleloscope is convenient as an alternative method of recording the centre of arc in circumstances when aiming posts cannot be used or when fog or smoke may be encountered. The drill for laying by the paralleloscope is described in Chapter 4. The following detail refers to the Mark 5A paralleloscope, which should be set up so that it is not fouled by the trail-eye throughout the complete arc of fire, *ie*, at about 15 feet from the dial sight a 135 degrees.

The paralleloscope can also be used to mark the current line of fire, not necessarily the centre of arc. The guns having been laid at the required bearing, the order is "**Paralleloscopes 135 degrees**". The drill is then as described in para 84 with the exception that no record is made of the main scale reading, and the dial sight is left laid on the paralleloscope.

## Drill

84. On the order "**Record as bearing . . . degrees. Paralleloscopes**", 4 obtains the paralleloscope and sets it up on the stand or the wall of the gun pit as ordered by 1. He tilts the paralleloscope board (normally away from the gun) so that the line of sight from the dial sight makes a small angle with the board. Using one of the parallel lines about three inches in from the right edge of the board (as seen from the dial sight) he rotates the board until the line is directed at the dial sight, and then clamps the board.

When the gun is laid in the required line, and GAP 1 recorded, 3 turns the dial sight on to a line about three inches in from the right edge of the paralleloscope board and positions the diaphragm over the window of the cowl.

If necessary, he orders "**Unclamp—turn right (or left)**", thus directing 4 to turn the paralleloscope board until one of the lines near the right edge is nearly parallel to the vertical cross wire of the dial sight. 4 turns the board steadily until 3 orders "**Halt—clamp**". 4 then clamps the board and takes up his position in action.

3 turns the micrometer heads of the dial sight until the vertical cross wire is accurately parallel to one of the lines.

3 and 1 then complete the drill for recording centre of arc, using the paralleloscope as GAP 2.

## SECTION 25.—TO CHECK THE CENTRE OF ARC, DIRECT METHOD

### Notes

85. As soon as centre of arc has been recorded, the GPO is responsible for checking that all guns are parallel in the centre of arc ordered. The methods which may be used are described in AT III, 3/56.

The only method which involves action by the gun detachments is the director method. The GPO's drill for this method is described in DUAL, 6/56.

At the conclusion of the check, the GPO will give the necessary orders for relaying the guns on the last target or on the DF(SOS) task when applicable.

If the passage of orders by voice is likely to be difficult, runners or tannoy are used as described in para 65.

### Drill

86. On the order : —

**"Check centre of arc".**

**"Aiming point—director".**

3 sets the slipping scale to the bearing of centre of arc, the sight clinometer at zero degrees, zero minutes and the range scale plate to 10 degrees. (The setting of the drift scale plate is immaterial).

1 checks that the main scale reading agrees with the reading recorded on the reading plate. If the readings do not agree, 1 reports to the GPO **"Error at No. ..."**.

3 relays on his GAP and then turns his dial sight on to the director.

1 notes the reading of the main scale. 3 reads the main scale and reports the reading to 1 as a check.

87. On the order **"No. ..."**. 1 reports the main scale reading, **"No. ... degrees ... minutes"**. The GPO repeats back the angle as reported. If the repetition is correct, 1 acknowledges. If the repetition is incorrect, 1 reports the correct angle again.

If the angle reported by 1 is found to be correct, the GPO orders "**No. . . correct.**" 3 then turns the dial sight back on to his GAP.

If the angle reported by 1 is found to be incorrect, the GPO orders "**No. . . . degrees . . minutes**". 1 repeats back to the GPO the angle ordered. If the repetition is correct the GPO orders "**No. . . record as bearing . . . degrees**". The new angle is used to lay the gun in the correct centre of arc, which is then recorded in the normal manner.

## SECTION 26.—**PARALLEL LINES TO A NAMED GUN**

### **Notes**

88. The GPO is responsible that his guns are always parallel unless a concentration or distribution has been ordered. The methods which may be used when it is required to correct any guns are described in AT III, 3/56.

The only method which involves a special drill by the gun detachment is the slipping scale method.

The slipping scale method can be used during the progress of a shoot and is a quick and accurate method for bringing guns parallel when they are known to have been parallel on centre of arc.

### **Drill**

89. On the order "**Parallel lines to No. . . .**", 1 of the named gun records the present reading of the slipping scale, and orders 3 to report the reading as a check.

- (a) 1 of each gun ensures that 3 is using the correct GAP, then orders 3 to set the main scale at the recorded reading for the GAP in use. 1 checks this setting and then ensures that the slipping scale is correctly set at the bearing of centre of arc, adjusting it if necessary.

(b) Provided no error is found at the named gun, 1 reports the slipping scale reading previously recorded to the GPO, "**No. . . . bearing . . . degrees . . . minutes**".

(c) If an error is found at the named gun after the drill in sub-para (a) above has been carried out 1 then turns the dial sight on to the GAP, records the new slipping scale reading and orders 3 to report the reading as a check.

1 reports this slipping scale reading to the GPO.

The GPO orders the angle reported by the named gun to all guns "**Bearing . . . degrees . . . minutes**" and the guns are laid in the normal manner.

## SECTION 27.—TO MEASURE THE ANGLE OF SIGHT TO A CREST

### Notes

90. Immediately after the guns are in action the GPO will normally require to know the angle of sight from each gun to any crests visible from the gun position.

### Drill

91. On the order "**Measure angle of sight to crest**", 1, assisted by 3, will lay the gun on the crest indicated by looking along the bottom of the bore. 3 then sets the tangent elevation scale at zero and brings the sight clinometer bubble to the centre of its run by means of the micrometer head. 1 reads the angle of sight to the crest from the sight clinometer scale and reports it to the GPO.

## SECTION 28.—TO LOAD

### Notes

92. On no account will the gun be loaded without the order "**Load**" from 1, except when engaging tanks (Chapter 3).

When a cartridge only is to be loaded, 1 will order "**Cartridge only—load**".

93. 1 will observe the following rules of fire discipline in deciding when to give the order to load:—

(a) *When percussion fuzes have been ordered.*

- (i) A gun is initially loaded as soon as a method of ranging or fire for effect is ordered for that gun.
- (ii) Throughout ranging, the ranging gun or guns will be reloaded as soon as fired.
- (iii) During section ranging only the right gun of the ranging section will load.
- (iv) At fire for effect, guns will not be reloaded sooner than is necessary to maintain the rate of fire ordered.
- (v) After an order for fire for effect has been carried out, guns will not be reloaded, until the GPO gives a fresh order for a method of fire or a method of ranging. If a method of ranging is ordered only the gun or guns ordered to range will be reloaded.

(b) *When time and percussion fuzes have been ordered.*

- (i) When the order "**Percussion**" is given by the GPO, eg, "**HE 213 percussion**", the rules for percussion fuzes will be followed. The order "**Percussion**" is cancelled by the order "**Airbursts**" or "**Corrector ..**"
- (ii) When "**Percussion**" is not ordered or is cancelled by "**Airbursts**" or "**Corrector**" no gun will be initially loaded until a method of ranging or fire for effect has been ordered for that gun, together with a fuze setting, or corrector and elevation. Once having loaded, guns will be reloaded

during ranging when a fresh elevation is ordered, and during fire for effect when a fresh method of fire for effect is ordered.

94. 1 is responsible that his gun is never left loaded while the gun is hot. If orders are received which would result in his gun being so left loaded, he will report to the GPO "**No. . . gun loaded, gun hot**".

95. Except when engaging tanks, 1 will check every cartridge immediately before it is loaded, in order to ensure:—

- (a) For charge 3 that the charges 2 and 3 bags are present.
- (b) For lower charges that the relevant charge bags have been removed.
- (c) For incremental charges that the relevant normal charge bags have been removed and the correct number of increments have been inserted.

The charge 1 bag is never removed.

The drill for charge super is described in para 103.

For cartridges which have been prepared in advance as described in Chapter 5, 1 will check the charge by looking at the marking on the cartridge case, and the drill will be the same as the normal drill for loading super charge.

When incremental charges are in use, the drill for charge 1 plus one increment will be the same as the normal drill for charge 1, and the drill for charge 2 plus one or two increments will be the same as the normal drill for charge 2.

96. When time and percussion fuzes are ordered, 1 will check the fuze setting of every round before it is loaded, except in the case of fuzes which have been prepared in advance as described in Chapter 5, when 1 will ensure that the shell is taken from the correct stack.

Whenever a fuze setting or change of fuze setting is ordered, 1 will check the setting of the hand fuze setter when in use. Having checked the hand fuze setter 1 may accept Fuze 213 as being correctly set when it is within .5 (point five) of the fuze setting ordered.

97. The preparation of ammunition is described in Chapter 5. As soon as the ammunition is ordered, 5 and 6 will prepare rounds for loading, 5 supplying 4 as required. Throughout each series 5 and 6 will always have six rounds prepared ready for loading.

4, 5 and 6 will set time and percussion fuzes to the setting ordered. When using the fuze setter hand, 5 will set the fuze setter to each fuze length ordered by 1, but fuzes themselves will only be set if an order is given which involves loading the gun.

98. Good ramming is essential. A badly rammed round may fall several hundred yards short of the correct range.

A correctly rammed round can be distinguished by the metallic clang as the driving band meets the rifling and by the abrupt check on the rammer. In addition, the brass sheath of the rammer serves as a measure of the required length of ram. Provided no part of the brass sheath protrudes to the rear of the face of the breech ring, the round can be accepted as being correctly rammed.

If the sheath does protrude, 2 will report to 1 "**Bad ram**". 1 will not order his gun to be fired but will inspect the chamber of the gun to see if light is showing past the projectile. If this is so he will report his gun out of action to the GPO who will order him to remove the round using the ejector projectile. 1 will inspect the chamber and bore for fouling. Once he is satisfied that the bore is clear he will reload and report his gun in action. If there is no light showing past the projectile he will report to the GPO "**No. . . . bad ram**" and will await further orders.

99. If difficulty is experienced in closing the breech after the cartridge has been loaded, 2 will first ensure that the primer is screwed right home, flush with the base of the cartridge case. He will then endeavour to close the breech by grasping the breech mechanism lever with both hands and exerting the whole force of his body against it.

If this attempt fails, 1 will order the cartridge to be unloaded, using the key removing jammed cartridge, if necessary.

On no account will an attempt be made to drive the cartridge home using the rammer or any other implement while the primer is still in position.

100. At drill, a clear distinction should be made between loading drill and gun drill.

At loading drill only 1, 2, 4 and 5 need to be present, and the complete drill round (shell and cartridge) should be loaded, exactly as described in para 101. Suitable arrangements should be made *eg*, using mats or sacking to protect the drill rounds from becoming damaged or dirty. After each series, drill fuzes will be recapped or reset to safe.

At gun drill, to avoid teaching false lessons, 4 should go through the motions of loading, but neither shell nor cartridge should be placed in the chamber. 2 should ram on the breech ring and 4 should push the extractors forward using the base of a drill cartridge.

On no account will service ammunition be used at gun drill or loading drill, and on no account will drill and service ammunition be mixed.

### **Drill with percussion fuzes**

101. *Charges 2 or 3.*—At the appropriate time, 1 orders "Load".

4, holding a shell at the point of balance in his left hand, and steadying it with his right, inserts the shell in the chamber, and withdrawing his right hand, supports the shell with his left hand placed behind the driving band.

2 rams the shell home and checks that no part of the brass sheath of the rammer is protruding to the rear of the face of the breech ring.

4 turns from the hips to the right and rear, and takes a cartridge from 5. 5 holds the cartridge near the mouth in the upturned palm of his right hand, with the base of the cartridge pointing down and towards 4. He holds the cup in his left hand, with the becket towards 4. 4 grasps the cartridge at the point of balance in his left hand and the cup in his right.

4 turns towards the breech and shows the cartridge to 1.

1 reports "**Correct**" or "**Wrong. Charge . . .**". If the charge is not correct, 4 either makes it so, or places the cartridge aside and receives another from 5, whichever is the quicker.

4 pushes the cup firmly into the mouth of the cartridge, ensuring that the becket does not protrude over the rim of the cartridge. He inserts the cartridge in the chamber and, placing his right fist behind the base, pushes it firmly home.

2 closes the breech.

5 supplies 4 with another shell, passing the shell between 4's right arm and body, with the fuze leading. 4 receives the shell and holds it until required by supporting the base on his knee and grasping the shoulder with his left hand.

102. *Charge 1.*—The drill is the same, except that 2, having rammed, and still holding the rammer in his left hand, turns the head of the rammer towards 4 and steadies the rammer with his right hand. 4 having received 1's report of "**Correct**", inserts the cup in the mouth of the cartridge and forces the complete cartridge on to the rammer in order to ram the cup firmly on to the charge.\*

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\* This is unnecessary when all charge bags are the same length.

103. *Charge Super.*—4, having loaded the shell, takes the complete cartridge in his left hand from 5's right hand. He shows 1 the marking "SUPER" on the cartridge case and then loads in the normal manner.

### **Drill with time and percussion fuzes**

104. 4, 5 and 6 set fuzes as ordered by 1.

On the command "**Load**", 4 shows the fuze to 1.

1 checks the fuze setting and reports "**Correct**" or "**Wrong. Fuze ..**". If the fuze setting is not correct, 4 either makes it so, or places the shell aside and receives another from 5, whichever is the quicker. 4 shows the fuze to 1. 1 checks the setting as above. 4 then loads in the normal manner.

## **SECTION 29.—TO UNLOAD THE CARTRIDGE**

### **Notes**

105. If a change of charge or "**Stand easy**" is ordered while the gun is loaded, 1 will order "**Cartridge only—unload**".

In order to avoid risk of loading a second shell after a period of "**Stand easy**", the rammer will be placed across the breech ring and will not be removed until 1 orders "**Cartridge only—load**".

106. A shell must not be left in the bore when the gun is hot (para 94).

### **Drill**

107. On the order from 1, "**Cartridge only—unload**", 2 opens the breech, taking care not to eject the cartridge violently.

4 withdraws the cartridge and returns it to 5.

1 checks that the complete cartridge has been removed.

108. If "**Stand Easy**" has been ordered, 2 places the rammer across the breech ring.

## SECTION 30.—TO LAY

109. The detailed drill of the layer for sight setting and laying is given in Chapter 4. This section describes the duties of the detachment for each of the different methods of laying.

110. Indirect laying with the sight clinometer is the normal method and is always used unless another method is ordered.

Paras 113 to 116 show the complete orders and action for laying the first round of a series. For subsequent rounds, only a few of these orders will normally be necessary and the drill will be as tabulated against the orders actually given.

111. 1 is responsible that his gun is always laid at the correct line and elevation.

He will measure all bearings with the aid of his centre of arc marker (para 71) or from the current line, and for switches greater than 30 minutes will move the trail to direct the gun into the required line. Switches can be measured as shown in Fig 1 by extending the hand at arm's length, or by means of degree marks on the spade, spadebox or platform. Moving the trail through the full width of the spade switches the gun through approximately 18 degrees.

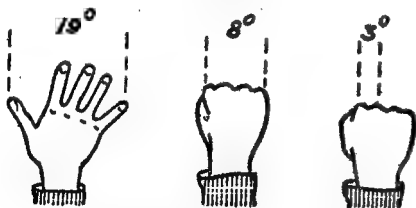


FIG 1—Measurement of angles

The figure shows the angles measured by the average hand when held at arm's length.

1 will check the setting of the sight clinometer whenever an angle of sight or a change of angle of sight is ordered.

Whenever a charge is ordered, he will check the setting of the drift scale plate and the range reader, and ensure that the MV corrector scale reader is set at the MV appropriate to the propellant ordered. He can normally make this check at the same time as he checks the sight clinometer.

He will occasionally examine the settings of the range scale plate, the range reader and the sight clinometer.

When "Direct laying" is ordered, he will check the setting of the cowl of the dial sight.

112. 1 is responsible for ordering the exact settings, or alterations of settings, to be applied to the sights in all cases when these settings are not ordered by the GPO, *eg*:—

*(a) Position corrections or gun corrections.*

1 is responsible for applying the corrections to all subsequent elevations ordered during the shoot, and for ordering to 3 the exact elevations to be set on the range scale plate. 1 is responsible for setting the exact elevations on the field clinometer.

*(b) Fuze corrections.*

1 is responsible for applying the fuze corrections to all subsequent fuze lengths ordered during the shoot and for ordering the exact fuze length to be set on fuze or setter hand.

*(c) Examples.*

(i) GPO orders "Position corrections. No. 2 minus 50, No. 4 plus 75" and subsequently orders "7200". 1 of No. 2 gun orders "7150" and 1 of No. 4 gun orders "7275".

- (ii) GPO orders "**Gun corrections. No. 2 minus 1 degree 6 minutes No. 4 plus 52 minutes**" and subsequently orders "**Elevation 21 degrees 44 minutes**". 1 of No. 2 gun sets the clinometer to 20 degrees 38 minutes and 1 of No. 4 gun sets the clinometer to 22 degrees 36 minutes.
- (iii) GPO orders "**Fuze corrections. No. 2 shorten point six. No. 4 Lengthen point four**", and subsequently orders "**Fuze 21.2**". 1 of No. 2 gun orders "**Fuze 20.6**" and 1 of No. 4 gun orders "**Fuze 21.6**".

## Drill

### 113. *Normal indirect laying.*

Orders	Action
"Charge ..".	3 repeats the charge, sets the drift scale plate and range reader as ordered and reports " <b>Set</b> ". 1 checks the settings.
"Bearing (or more or less) .. degrees .. minutes".	1 measures the switch and moves the trail as required. 3 sets the dial sight as ordered.
"Angle of sight .. degrees .. minutes elevation (or depression)." " .. (elevation)".	3 sets the sight clinometer as ordered. 1 checks the setting. 3 repeats the elevation, sets the range scale plate as ordered, and reports " <b>Set</b> ". 3 lays. If the gun is loaded, he then places his right hand on the firing lever and reports " <b>Ready</b> ".

114. *Clinometer laying, ie, indirect laying with the field clinometer.*

Orders	Action
<b>"Charge .. "</b>	3 repeats the charge, sets the drift scale plate and range reader* as ordered and reports <b>"Set"</b> . 1 checks the settings.
<b>"Bearing (or more or less) .. degrees .. minutes"</b>	1 measures the switch, and moves the trail as required. 3 sets the dial sight as ordered.
<b>"Clinometer laying"</b>	1 obtains the field clinometer. 2 ensures that the breech clinometer plane is free of dust or grit.
<b>"Angle of sight .. degrees .. minutes elevation (or depression)"</b>	3 sets the sight clinometer as ordered. 1 checks the setting.
<b>"Gun corrections— No. 1 .. No. 2 .. No. 3 .. No. 4 .."</b>	1 applies his gun correction and any correction required for index error of the field clinometer, sets the clinometer and hands it to 2.
<b>"Elevation .. degrees .. minutes"</b>	2 reads the setting of the field clinometer, calls out the reading and places the clinometer on the clinometer plane with its arc to the rear and its side parallel to the right edge of the plane.

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\* The fact that the range scale plate will not be used is not at this stage known to 3.

**Orders****Action**

- 3 lays. If the gun is loaded he then places his right hand on the firing lever and reports "**Ready**".
- 1 removes the field clinometer.

115. *Direct laying with the dial sight.\****Orders****Action**

"Charge ..".

- 3 repeats the charge, sets the drift scale plate and the range reader as ordered and reports "**Set**".
- 1 checks the settings.

"Direct laying, dial sight".

- 3 sets the main scale of the dial sight at zero, and sets the cowl at the reading recorded on the shield "for firing".
- 1 checks the setting.
- 2 and 3 lower the shield flap.

"Reference point .."  
 "Right (or left) .. o'clock .. degrees".

- 1 directs the gun at the target by moving the trail as necessary, ordering "**On**" when the gun is directed at the target.

".. (description of target)".

- 3 satisfies himself that he has recognized the target.

---

\* The drill for the engagement of tanks by direct laying is described in Chapter 3.

- "More (or less .. minutes" (if necessary).** 3 sets the deflection on the dial sight in the normal manner.
- " .. (elevation)".** 3 repeats the elevation, sets the range scale plate as ordered, and reports **"Set"**.
- 3 lays. If the gun is loaded 3 then places his right hand on the firing lever and reports **"Ready"**.

*116. Direct laying with the telescope or open sight.\**

Orders	Action
<b>"Charge .. "</b>	3 repeats the charge, sets the drift scale plate and the range reader as ordered and reports <b>"Set"</b> .
	1 checks the setting.
<b>"Direct laying, telescope (or open sight)".</b>	3 opens the sight port cover.
<b>"Reference point .. "</b>	1 directs the gun at the target by moving the trail as necessary, ordering <b>"On"</b> when the gun is directed at the target.
<b>"Right (or left) .. o'clock .. degrees".</b>	
<b>" .. (description of target)".</b>	3 satisfies himself that he has recognized the target.

---

\* The drill for the engagement of tanks by direct laying is described in Chapter 3.

Orders	Action
“Right (or left) . . ”.	3 repeats the lead, sets it on the open sight and reports “Set”.
“ . . (elevation) ”.	3 repeats the elevation, sets the range scale plate as ordered and reports “Set”.
	3 lays. If the gun is loaded 3 then places his right hand on the firing lever and reports “Ready”.

### To change from direct to indirect laying during a shoot

117. On the order “Indirect”, 1 turns the dial sight onto a GAP. 3 identifies the GAP by looking through and over the dial sight.

3 lays as in indirect laying. If the gun is loaded, he then places his right hand on the firing lever and reports “Ready”.

118. In all cases (paras. 113 to 117), if the gun is loaded after 3 has completed the lay, he will check the lay and re-lay if necessary before placing his right hand on the firing lever and reporting “Ready”.

### To measure quadrant elevation

119. On the order “Report QE”, 3 lays at the last line and elevation ordered. 1 places the field clinometer on the clinometer plane and centralizes the bubble by moving the arm and slider. He reads the setting and then passes the field clinometer to 2. 2 reads and calls out the setting as a check. 1 sends a report to the GPO of the field clinometer reading and the correction for index error, if any.

## SECTION 31.—TO FIRE

## Notes

120. On no account will the gun be fired without the order "**No. . . fire**" from 1, except when engaging tanks (Chapter 3), or when the sentry fires the gun on a DF (SOS) task (*see* AT III, 2/56, Sec 31).

Before ordering his gun to be fired, 1 must be satisfied that his turn to fire has come, that his gun is ready, that the detachment are clear of recoil and that the trajectory will be well clear of any crest or obstacle, such as a tree, close in front of the gun. In cases of doubt he will satisfy himself that the trajectory will clear, by looking along the piece for line and along the upper edge of the cradle for elevation.

At drill, the firing mechanism will be removed, in order to avoid damage to the striker.

121. The opening round of a shoot will not be fired until the GPO has ordered "**Fire**".

When "**Fire by order**" or "**Salvo ranging**" has been ordered, Nos. 1 will order "**Fire**" at the appropriate moment after the order "**Fire**" from the GPO. "**Fire by order**" remains in force until either "**Cancel fire by order**" or a fresh sequence of initial orders is given.

If at "**Fire by order**" a single order specified more than one round, the GPO's order "**Fire**" authorizes the firing of all the rounds specified.

122. Whenever the executive order to fire must come from the GPO Nos. 1 will report their guns ready by raising one arm if they are visible from the command post, or by reporting "**No. . . ready**" if they are not visible. The GPO will acknowledge by ordering "**Down . . (number of gun(s))**".

123. After the opening round of a shoot, and when "Fire by order" or "Salvo ranging" is not in force, Nos. 1 will order their guns to be fired as follows:—

(a) *During ranging*.—Each elevation ordered is the order for 1 of the ranging gun to fire as soon as his gun is ready.

(b) *During fire for effect*.—The method of fire, ordered by the GPO is the order for Nos. 1 to fire as follows:—

(i) *When gun fire is ordered*.—Each gun independently fires the number of rounds ordered, each No. 1 ordering his first round to be fired as soon as the gun is ready, and subsequent rounds at the correct interval thereafter.

(ii) *When troop fire is ordered*.—The guns are fired in succession from the right of the troop and then again in succession from the right until each gun has fired the number of rounds ordered. No. 1 of the right gun orders his first round to be fired as soon as his gun is ready. Subsequent Nos. 1 give the order to fire at the correct interval thereafter.

If troop fire from the left is ordered, the same drill is followed, but beginning from the left and firing in succession from left to right.

124. *Interval*.—The interval is ordered in seconds, eg, "4800, three rounds gun fire, 30 seconds".

(a) *At gun fire*.—The interval means the time between the firing of two rounds by any one gun. If no interval is ordered, each No. 1 orders successive rounds to be fired as soon as his gun is ready.

- (b) *At troop fire.*—The interval means the time between the firing of one gun and the next following gun. If no interval is ordered, a standard interval of five seconds will be observed.

### Drill

125. At the appropriate moment 1 orders “No. . . fire”.

3 pulls the firing lever.

2 opens the breech as the gun runs out.

3 checks the setting of the range scale plate and re-lays.

If the gun fails to run out completely, 1 orders it to be pushed home and takes any necessary action to remedy the fault.

### SECTION 32.—MISFIRES

#### Notes

126. The drill is designed to disclose the cause of failure to fire and thus to indicate the correct immediate remedy. When this remedy is of a temporary nature, 1 will later carry out a full examination and ensure that the defect is corrected. He will then report the cause of failure to the GPO and in the case of defective ammunition will send the defective primer or cartridge to the command post for examination.

Failures to fire can be divided into two main classes depending on whether or not the striker has gone forward.

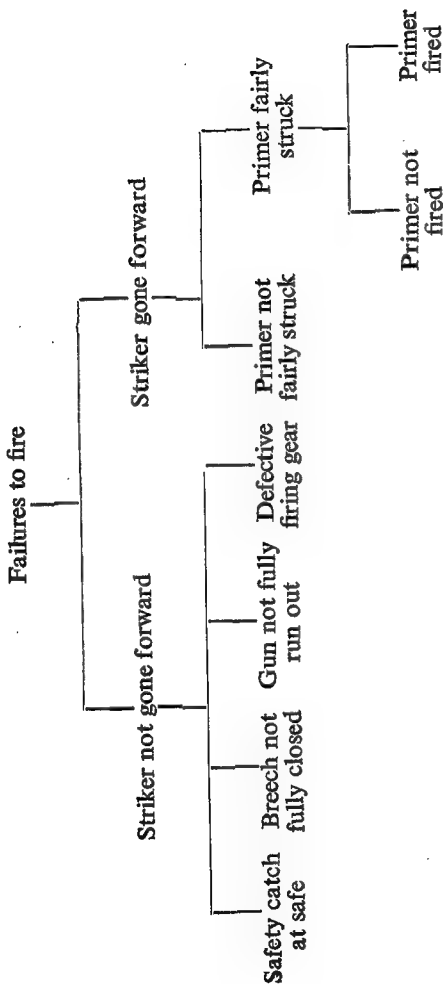


FIG 2—Failures to fire

127. *If the striker has not gone forward.*—The probable causes, the immediate remedies and the subsequent action where necessary are as follows:—

- (a) *Safety catch set at "Safe".*—2 sets the safety catch to "Fire".
- (b) *Breech not fully closed.*—2 forces the breech mechanism lever into the fully closed position.
- (c) *Gun not fully run out.*—2 sets the safety catch to "Safe" and orders "**Push home**". 1 ensures that the safety catch is at "Safe". If necessary 1 orders "**Depress**" and 3 depresses the gun. 2, 4 and 5 push the gun into the fully run out position. 2 sets the safety catch to "Fire". 3 re-lays.
- (d) *Defective firing gear.*—This fault is indicated by a second failure to fire with the striker not gone forward. 1 orders "**Emergency firing**" (para 167). At the first opportunity, 1 examines the firing gear and corrects the defect.

128. *If the striker has gone forward.*—The gun is said to have misfired if the striker has twice gone forward and the gun twice failed to fire. On account of the danger of a "hang fire", a pause of one minute\* is then made before the breech is opened to investigate the cause of the misfire.

The probable causes, the immediate remedies and the subsequent action where necessary are as follows:—

- (a) *Primer not fairly struck.*—This fault is due to insufficient protrusion of the striker. 1 fits the spare firing mechanism. At the first opportunity 1 tests the protrusion of the original striker, and if necessary fits a new firing pin.

---

\* When firing blank a pause of 30 mins will be made (see Sec 49).

(b) *Primer fairly struck.*—4 loads a fresh cartridge. At the first opportunity 1 examines the mis-fired cartridge and:—

(i) *If the primer has not fired.*—This may be due to a defective primer or to insufficient force of blow. 1 fits a spare primer. If the primer cannot be removed the affected round will be set aside for disposal by an IOO. On no account will the charge bags be loaded into a used cartridge case, fitted with a new primer and fired. If the fault recurs, insufficient force of blow is indicated and 1 fits the spare firing mechanism. At the first opportunity 2 examines and cleans the firing mechanism and its recess, including the firing hole.

(ii) *If the primer has fired.*—The failure of the primer to ignite the charge indicates either defective propellant or an unfilled primer. 1 fits a spare primer. If the fault recurs, defective propellant is indicated and 1 sends the cartridge to the command post for examination and disposal as described for defective ammunition in para 157.

129. As soon as his gun is again ready, 1 reports "**Ready**" to the GPO or fires without further orders as follows:—

(a) During a programme shoot, he orders the correct line, angle of sight and elevation for the time at which he is ready, and continues the programme. Rounds detailed for the time during which his gun is out of action will lapse.

(b) On all other occasions he reports his gun ready and awaits further orders.

## Drill

130. If the gun fails to fire, 3 orders "**Check the breech**" and takes his right hand off the firing lever, 2 inspects the cocking handle:—

(a) *If the striker has gone forward.*—He recocks the firing mechanism, using the cocking lanyard, and reports "**Recocked**".

(b) *If the striker has not gone forward.*—He ensures that the breech is fully closed, the gun fully run out and the safety catch set at "**Fire**". He then reports "**Breech correct**".

As soon as 2 reports "**Recocked**" or "**Breech correct**", 3 again pulls the firing lever.

131. If the gun again fails to fire, the same drill is carried out again, except that when 2 reports "**Recocked**" or "**Breech correct**", 3 does not pull the firing lever.

132. After two reports of "**Breech correct**", 1 orders "**Emergency firing**" and 4 then fires the gun at 1's command for the remainder of the series.

133. After two reports of "**Recocked**", 1 reports to the GPO "**No. . . misfire**" and orders "**Stand clear**". After a pause of one minute\* 1 orders "**Cartridge only—unload**". 4 hands the unloaded cartridge to 1 who checks that the complete cartridge has been removed and inspects the primer.

(a) *If the primer has been fairly struck.*—1 sets the cartridge aside for examination later and immediately orders "**Cartridge only—load**".

If the same fault has occurred with the immediately preceding cartridge, insufficient force of blow is indicated and 1 also changes the firing mechanism.

---

\*When firing blank, a pause of 30 minutes will be made.

(b) *If the primer has not been fairly struck.*—1 returns the cartridge to 5 and immediately changes the firing mechanism and orders “Cartridge only—load”.

1 then reports his gun ready to the GPO or orders “Fire” as appropriate.

### SECTION 33.—TO RECORD A TARGET

#### Notes

134. A record may be required from each gun which has engaged a target, giving complete details of the final data at which the target was engaged. Nos. 1 should fill in the details on AF B 2649 as shown in the following example:—

Army Form B 2649

#### TARGET RECORD REPORT

(No. 1 to GPO)

(a) Target letter and number	P 2104
(b) Number of gun	4
(c) Ammunition	
Shell	HE
Fuze	213
Driving band	
Propellant	WM
Charge	3
(d) Bearing	2° 35'
(e) Angle of sight	1° 10' E
(f) Position or gun correction	+ 75
(g) Corrector or fuze setting	17.4
(h) Elevation on sights or gun rule	5775

When clinometer laying has been ordered, the field clinometer setting and the correction for index error will be reported instead of the elevation on the range scale plate.

When gun rules are used, the elevation in yards set on the range slide of the gun rule will be reported instead of the elevation on the range scale plate, and 1 will check that the setting of the tangent elevation scale of the sights agrees with the reading of the tangent elevation scale of the gun rule.

If it does not agree, 1 will report the range read from the gun rule against the tangent elevation at which his gun is laid.

### **Drill**

135. On the order "**Record as target** .. (letter and number)", 1 of each gun which has fired during the shoot inspects the ammunition, sights, gun rule and fuze indicator and fuze setter where applicable and completes AF B 2649 as described.

1 then calls for reports of the required details from 2, 3 and 6, and compares these reports with his record. Having corrected any discrepancy, he sends the record to the command post.

## **SECTION 34.—TO SWEEP**

### **Notes**

136. Sweeping is ordered when it is required to spread the fire of each gun over a wider frontage. The sweeping is carried out by counting turns of the traversing handwheel (two turns=one degree), the setting of the dial sight being left unchanged.

If the order "**Sweep one degree**" is given after an order to fire a number of rounds, each gun is first fired on the line ordered, then on a line one degree to the right and then on a line one degree to the left of the line ordered.

### **Drill**

137. On the order "**Sweep** .. degrees", 3 lays on the line last ordered.

As soon as the gun has been fired, 1 orders the amount of the sweep to the right, "**Right** .. degrees".

3 traverses to the right by the amount ordered, using the traversing handwheel. He then re-lays for elevation.

After the second round has been fired, 1 orders twice the amount of the sweep to the left "**Left .. degrees**".

3 traverses to the left by the amount ordered, using the traversing handwheel. He then re-lays for elevation.

After the third round has been fired, 1 orders the amount of the sweep to the right "**Right .. degrees**".

3 traverses to the right by the amount ordered, and then re-lays on his GAP in the normal manner.

The procedure is repeated as required until the number of rounds ordered has been fired. 3 then re-lays on his GAP.

## SECTION 35.—TO SEARCH

### Notes

138. Searching is ordered when it is required to spread the fire of each gun in depth. The elevations are set on the range scale plate for each round and the gun is laid in the normal manner.

If the order "**Search one hundred**" is given after an order to fire a number of rounds, the first round is fired at the elevation ordered, the second at an elevation greater by 100 yards and the third at an elevation less by 100 yards than the elevation ordered.

139. If "**Search one hundred by fifties**" is ordered the second and third rounds are fired at 50 yards and 100 yards respectively plus of the original elevation, and the fourth and fifth rounds 100 yards and 50 yards respectively minus of the original elevation.

### Drill

140. On the order "**Search ..**", 3 lays at the elevation ordered.

As soon as the gun has been fired, 1 orders the amount of the search as an increase in elevation, "**Add ..**".

**3** applies the additional elevation by means of the range scale handwheel and reports the actual elevation set on the range scale plate, "**.. (elevation), set**". He then lays in the normal manner.

After the second round has been fired, **1** orders twice the amount of the search as a drop in elevation, "**Drop ..**".

**3** applies the drop in elevation, reports the actual elevation set, and lays.

The procedure is repeated as required until the number of rounds ordered has been fired. **1** then orders the original elevation and **3** re-lays.

#### SECTION 36.—TO STOP FIRING

**141.** On the order "**Stop**", the detachment continue their duties but the gun is not fired until the order "**Go on**" or a fresh sequence of initial orders is received.

#### SECTION 37.—TO STAND FAST

**142.** On the order "**Stand fast**", all immediately remain motionless, whatever they may be doing. On the order "**Go on**", work is continued.

#### SECTION 38.—TO STOP LOADING

**143.** After the order "**Stop loading**", no gun will be loaded until the order "**Go on**" or a fresh sequence of initial orders is received. Preparation of ammunition is suspended.

In all other respects, the detachment continue their duties, and any gun already loaded will be fired at the appropriate moment in accordance with orders received.

## SECTION 39.—TO MAKE SAFE

**Notes**

144. If the gun is loaded, 1 must order **"Make safe"**:—

- (a) When the order **"Rest"** is received.
- (b) When personnel are required to work in front of the gun or in the path of recoil.
- (c) If it is necessary to run the gun off its platform or to run up (Sec 48).

145. **"Make safe"** is cancelled by **"Take post"** (Sec 42).

**Drill**

146. 1—"Make safe".

2 sets the safety catch to **"Safe"**.

1—"Take post".

2 sets the safety catch to **"Fire"**.

## SECTION 40.—TO REST

**Notes**

147. When the order **"Rest"** is given, the detachments remain at their guns ready to fire at short notice. Nos. 1 of any guns ordered to rest do not acknowledge subsequent orders nor do the detachment follow up orders. **"Rest"** is cancelled by **"Take post"** or by a fresh sequence of initial orders.

The guns must remain laid as last ordered.

**Drill**

148. On the order **"Rest"** 1 orders **"Make safe"** if his gun is loaded. He gives orders for any necessary work to be carried out around his gun, and when the work is completed orders **"No. . . rest"**. The detachment rest at their positions in action.

## SECTION 41.—TO STAND EASY

**Notes**

149. When the order "**Stand easy**" is given, the detachments concerned are withdrawn from their guns to a position previously ordered by the GPO. Nos. 1 of detachments concerned do not acknowledge subsequent orders until "**Stand easy**" is cancelled by "**Take post**" or by a fresh sequence of initial orders.

150. At "**Stand easy**" 1 will normally order fuzes to be recapped and cartridges to be made up to charge 3 by replacing any portions which have been removed. Care will be taken not to mix different natures of propellant in the same cartridge.

When all work at the guns is completed, the guns must be left laid as last ordered.

**Drill**

151. On the order "**Stand easy**", 1 orders "**Cartridge only—unload**" if his gun is loaded. He gives orders for any necessary work to be carried out around his gun. He examines the muzzle brake. When this work is completed he orders "**Detachment rear**", marches the detachment to the position ordered by the GPO and orders "**Fall out**".

## SECTION 42.—TO TAKE POST

**Notes**

152. The order "**Take post**" is given by the GPO in order to continue a shoot which has been temporarily suspended by the order "**Rest**".

The order is also given by the GPO or No. 1 whenever he requires the detachment to resume their positions in action.

**Drill**

153. On the order "**Take post**", the detachment immediately take up their positions in action.

If the detachment has been at "**Rest**" 2 ensures that the safety catch is set to "**Fire**".

If the detachment has been at **"Stand easy"** 1 will examine the muzzle brake and then order **"Cartridge only—load"** when necessary.

### SECTION 43.—TO PREPARE TO ADVANCE (OR WITHDRAW)

154. On the order **"Prepare to advance (or withdraw)"**, Nos. 1 will order ammunition and stores not required for the immediate service of the gun to be repacked. Preparations for coming out of action will be made as far as possible, but the guns must remain in action until **"Cease firing"** is ordered.

Nos. 1 will normally decide the most convenient direction for limbering up and may direct the trailer to be moved, if necessary, in preparation.

### SECTION 44.—TO EMPTY GUNS

155. On the order **"Empty guns"** any guns already loaded will be laid at the last line and elevation ordered, and will be fired. The order **"Empty guns"** is in itself an order to fire, and no additional order is required if **"Fire by order"** happens to be in force.

Ammunition prepared for loading will be examined and if serviceable will be dealt with as follows:—

- (a) *Fuzes with safety caps.*—Recapped.
- (b) *Time and percussion fuzes.*—Set to **"Safe"**.
- (c) *Shell fuzed VT.*—Unfuzed, fuzes replaced in containers and shell plugged or refuzed with percussion fuzes.
- (d) *Cartridges.*—Made up to charge 3 by replacing portions which have been removed, taking care not to mix propellant natures. Unserviceable ammunition will be reported to the GPO.

156. As soon as his gun is empty and all ammunition prepared for loading has been disposed of as in para 155, 1 will report to the GPO "**No. . . empty**".

157. The following ammunition is unserviceable and will on no account be fired or put back in the vehicles:—

(a) Shell fuzed 117 or 119 with damaged or deficient striker covers.

(b) Shell fuzed with time and percussion fuzes which cannot be set to "**Safe**".

(c) Shell fuzed VT which cannot be unfuzed.

At practice, defective ammunition will be set aside for examination by an IOO(RAOC).

During operations, defective ammunition will be dumped and clearly marked.

## SECTION 45.—**TO CEASE FIRING AND LIMBER UP** **Notes**

158. The guns must be empty before "**Cease firing**" is ordered (Sec 43). Nos. 1 will normally be left to choose the most convenient direction for limbering up. At drill, the instructor may order the direction of limbering up.

The signals which are used by 1 to direct the movement of the tractor are described in Sec 16.

## **Drill**

159. On the order "**Cease firing**", 1 disconnects the tannoy.

2 closes the breech and eases the striker forward while 3 pulls the firing lever. 3 unclamps the dial sight and closes the sight port cover, if open.

2 straps the rammer to the trail and fixes the cradle clamp. He removes the dial sight from its socket, sets it to zero and replaces it in its case. He replaces the cocking lanyard and gun rule, and ensures that the brake is off.

3 replaces the sighting telescope and sight clinometer in their cases and clamps the cradle.

If the troop leader has ordered "**Covers off**", the breech, muzzle and sight covers are left strapped to the trail. Otherwise 2 replaces the breech and muzzle covers, while 3 sets the range scale gear at stops, screws the cross levelling gear home and replaces the sight cover.

2 and 3 lower and lock the shield flap.

4 straps the aiming posts and dragropes to the shield if they have been removed. He replaces the fuze keys and fuze setter.

5 and 6 replace ammunition in the trailer and close all doors.

6 replaces the fuze indicator and reels in the tannoy cable.

160. 1 orders "**Rear (or left, right or front), limber up**", and directs any necessary movement of the trailer. He then mans the traversing handspike and, assisted by 2 and 3 if necessary, moves the trail into the required direction.

2 and 3 unlock the platform stays and lift them to break the joints; the front lower joint must be broken first.

2 and 3 push in rear of the shield, 4 and 5 man the wheels, 1 and 6 man the traversing handspike, 1 orders "**Heave**" and the gun is run off the platform. 2 controls the movement with the brake if necessary.

The detachment then prepare to lift the platform, 2 and 3 nearest the breech. 1 orders "**Lift**". The platform is lifted, 2 and 5 attach the platform hooks to the chains and report "**Hooked**". 1 orders "**Clamp**". 2 and 5 clamp the platform. 1 replaces the traversing handspike, and with the Mark 3 carriage pulls out the retaining plunger and lowers the trail eye to the travelling position.

4, 5 and 6 manhandle the trailer as directed by 1, 2 and 3 raise the trail and place the trail eye on the trailer hook. 5 and 6 swing the perch away from the direction of approach of the tractor. The detachment

then take up positions ready to hook in to the tractor, 1 in a convenient position for directing the tractor, 2 and 3 in rear of the shield, 4 by the left gun wheel, 5 and 6 beside the trailer wheels.

1 signals the tractor to drive up, halt and reverse until close to the perch eye. He orders "**Hook in**" and goes to the right gun wheel.

5 and 6 lift the trailer perch and place the perch eye on the towing hook, 2 and 3 pushing in rear of the shield and 1 and 4 manning the gun wheels. 5 and 6 close the lifting handles.

The detachment replace ammunition and stores in the tractor and then mount without further orders, 1 first looking round to ensure that the gun is in all respects ready to travel. 1 directs the driver to the position of assembly ordered.

At drill, when no towing vehicles are available, the detachment form detachment rear.

#### SECTION 46.—**DRILL WITH REDUCED DETACHMENTS**

161. In action, the detachment may be reduced by reliefs, casualties or men employed on other details. With reduced detachments the drill is carried out as far as possible in the normal way, duties being combined as directed by 1. The following allotment of duties can be taken as a guide:—

- (a) With five men. . . One man performs the duties of 5 and 6.
- (b) With four men. . . One man performs the duties of 5 and 6.  
One man performs the duties of 1 and 2.
- (c) With three men One man performs the duties of 4, 5 and 6, except setting the fuze indicator.  
One man performs the duties of 1 and 2 and sets the fuze indicator.

## SECTION 47.—**DRILL WITH DAMAGED EQUIPMENT**

162. These notes cover variations of drill to be used in action when the damaged equipment cannot be replaced or repaired.

163. *Damaged sight clinometer.*—3 sets the angle of sight ordered on the field clinometer. 1 checks the setting and places the field clinometer on the sight clinometer bracket and 3 lays in the normal manner. As soon as the gun is laid, and before reporting "Ready", 3 removes the field clinometer.

164. *Damaged range scale gear or sight clinometer bracket.*—The GPO or section commander orders clinometer laying.

165. *Damaged dial sight.*—The GPO or section commander directs the gun into the required bearing (eg, using a borrowed dial sight or compass) and orders aiming posts to be planted in line with the telescope or open sights. 3 lays for line on the aiming posts. If a bearing is ordered outside the scope of the telescope or open sight, the aiming posts are replanted by the same method.

166. *Damaged cross level bubble.*—3 follows the normal sequence of laying but cross-levels by bringing the pillar of the dial sight as nearly vertical as he can judge by eye.

167. *Damaged firing gear (Sec 32).*—4 fires the gun on the order from 1, by pushing on the trigger sear with a suitable implement, eg, the rammer, a 12-inch screwdriver or a stick.

168. *Damaged platform.*—If the platform cannot be used in action, the drill is carried out as described in Sec 48.

If the platform cannot be clamped under the trail at "Cease firing", it is carried on the trailer.

## SECTION 48.—DRILL WITHOUT THE PLATFORM

169. As soon as it is known that the platform will not be used, 1 and 4 remove the spade box and fix it to its housing bracket.

The drill for coming into action or limbering up is carried out in the normal manner but omitting those parts concerned with the platform.

170. In action, 2 applies the brake for the first round after each movement of the trail and takes the brake off as soon as the spade is embedded.

In action until the spade is embedded, 1 moves the trail for switches as in the normal drill. After the trail is embedded, 3 applies all switches which are within the limits of the traversing gear. When a switch is ordered beyond the limits of the traversing gear, 1 orders "**Run up**", having first ordered "**Make safe**" if the gun is loaded.

171. *To run up.*—On the order "**Run up**", 2 ensures that the brake is off and 3 brings the traversing gear to zero. 2 and 4 man the wheels. 6 obtains a dragrope, hooks it to the left lifting handle of the trail and with 5 mans the dragrope in rear of the shield facing the rear.

1 orders "**Heave**", and the spade is cleared.

If necessary, 1 orders "**Dragrope—trail right (or left)**". 2, 4, 5 and 6 man the dragrope. 1 orders "**Heave**" and the trail is moved as required.

If the trail can be moved without difficulty, 1 orders "**5 and 6—take post**" and, assisted by 2 and 4 on the wheels, directs the gun into the required line. 6 replaces the dragrope.

When the gun is in the required line, 1 orders "**Take post**". 2 puts on the brake and ensures that the safety catch is set at "**Fire**".

## SECTION 49.—PRECAUTIONS TO BE OBSERVED WHEN FIRING BLANK AMMUNITION

172. No officer, NCO or gunner who has not been trained and passed in gun drill may command a section, or form part of a gun detachment, firing blank ammunition at salutes or at training.

When firing QF blank cartridges, no gun will be reloaded within 15 seconds after firing. Even after this interval, no gun will be reloaded until 1 has examined the chamber and bore and removed any debris.

In the event of a misfire, the normal misfire drill is carried out, except that a pause of not less than 30 minutes must be allowed to elapse before the breech is opened. No one will be in rear of the breech when it is opened. An officer or senior NCO should be detailed for the special duty of timing the interval after a misfire and informing 1 of that gun when the breech may be opened.

## CHAPTER 3

### ANTI-TANK DRILL

## SECTION 50.—PREPARATION FOR OPENING FIRE

173. In choosing the troop position, the GPO will have considered its suitability for anti-tank defence and will have sited individual guns to achieve the best defence consistent with the need for concealment, ease of control and the ability to carry out the normal field artillery tasks.

In order to ensure an all round watch for tanks and to provide a rapid means of indicating targets, the GPO will allot sectors of observation to each gun. The following standard allotment is convenient and can be modified when necessary:—

No. 1 .. Right rear	No. 2 .. Right sector
No. 3 .. Left sector	No. 4 .. Left rear

In order to provide a means of indicating difficult targets, the GPO will normally choose one or two reference objects in each sector and will indicate these to the Nos. 1, together with the name of each reference object and the range to it.

The GPO will normally lay down the maximum range at which fire is to be opened.

The GPO is responsible when necessary for ordering the special states of preparedness described below and for the general control of the fire of the troop, including the allotment of targets to sections or guns and giving the executive order to engage the targets.

174. As soon as possible after coming into action, 1 makes the following "Normal" preparations for anti-tank defence:—

- (a) He ensures that his detachment know the sector for which they are responsible, the reference objects in all sectors, their names and the ranges to them, and the range for opening fire as ordered by the GPO.
- (b) He orders his trailer to be so placed that it does not interfere with the field of fire of his or any other gun. The GPO will order the trailer of the left gun to be placed on the right of the gun if he considers that there is any possibility of attack by tanks.
- (c) He orders cartridges to be tried in the chamber and then set aside in convenient positions with AP shot, or HESH.

175. When a threat of tank attack is reported, the GPO will order "**Prepare for tanks**" or "**Tank alert**". When the threat is past, the normal state will be restored by the order "**Cancel prepare for tanks**" or "**Cancel tank alert**".

176. The order "**Prepare for tanks**" means that a tank attack is considered likely, but not necessarily imminent. The guns remain laid on their present task.

1 ensures that all his preparations for the normal state have been completed, and that at least one of the detachment is keeping a close watch on the sector allotted to the gun. 3 fits the elbow strap. Camouflage nets are removed, if ordered.

177. The order "**Tank alert**" means that a tank attack is considered imminent.

Any other task on which the guns are engaged lapses forthwith.

The guns are loaded.

The sight port cover is opened and the range scale plate set at the range for opening fire as previously ordered by the GPO.

The main and slipping scales of the dial sight are set at zero and the cowl at the setting "for firing" as recorded on the shield. The traversing gear is brought to zero.

A close watch is kept on the sector allotted to the gun.

178. When tanks are seen the GPO indicates the direction to some or all guns by means of the pre-arranged sectors.

Until the GPO orders "**Engage**", Nos. 1 concerned do not order "**Fire**", but issue all other necessary orders and follow up the movement of the tanks with their guns.

When the tanks are recognized as hostile and are within effective range the GPO passes control of fire to all or some of the Nos. 1 by ordering "**Troop** (or .. section, or No. ..) **engage**".

"**Engage**" is cancelled by "**Stop**".

## SECTION 51.—ANTI-TANK DUTIES

179. *Duties of 1.*—1 is responsible for the control of the fire of his gun:—

(a) He selects the most dangerous target in the direction indicated by the GPO.

(b) He indicates this target to 3 and 6 by directing the gun at it.

- (c) He gives the initial orders for the engagement.
- (d) He takes up a position from which he can observe.
- (e) He orders "**Fire**" when all the following conditions are satisfied:—
  - (i) He is ready to observe.
  - (ii) The target is within the range for opening fire.
  - (iii) The GPO has ordered "**Engage**".
- (f) He observes and if necessary corrects the fire of his gun. He makes no correction on any round for which 3 has reported "**Wrong**", but repeats "**Wrong**" back to 3.
- (g) He orders "**Traverse**" or "**Stop traversing**" when required (para 200).
- (h) He orders "**Stop**" when he is satisfied that the target is destroyed, or if it has passed out of range. He then selects a fresh target and engages it. If it is in the same group as the last he may use abbreviated initial orders, eg, "**Stop. Far tank, 600, go on**" or "**Stop. Next left. Left one. Go on**". Otherwise he gives a complete set of initial orders and if it is not practicable to return to the trail to indicate the target to 3 and 6, he describes its position by means of the sectors or reference objects.

180. *Duties of 2.*—2 carries out his normal duties.

181. *Duties of 3.*—3 is responsible for sight setting, laying and firing:—

- (a) He ensures that he has recognized the target indicated by 1. If he is uncertain, he reports "**Target lost**".
- (b) He repeats all ranges ordered by 1, sets them on the range scale plate and reports "**Set**".

- (c) He repeats all leads ordered by 1, and if using the open sight or dial sight, sets them on the sight in use and reports "**Set**".
- (d) He repeats "**Traverse**" or "**Stop traversing**" if ordered.
- (e) He does not fire the first round of a shoot until 1 has ordered "**Fire**". Thereafter he fires without further orders as soon as the gun is correctly laid and 4 has signified that it is loaded.
- (f) He reports "**Wrong**" if he realizes that he has fired when the gun was incorrectly laid.
- (g) He changes to the open sight or dial sight without orders if the telescope becomes obscured. He sets the correct lead, reports "**... sight ... (lead) set**" and continues the engagement.  
He similarly changes to the telescope if necessary, reporting "**Telescope ... (lead)**".
- (h) He orders "**Target right (or left)**" when a special movement of the trail is necessary.
- (j) He reports "**Target lost**" if he cannot see the target.

182. *Duties of 4.*—4 is responsible for loading and for indicating to 3 when the gun is ready to fire:—

- (a) As soon as 2 has opened the breech 4 places a round in the breech. He does not support the base of the round as in normal loading, but immediately takes a cartridge from 5.
- (b) As soon as 2 has rammed, 4 loads the cartridge, without showing it to 1 or 6.
- (c) As soon as the breech is closed and the detachment clear, he glances at the safety catch to see that it is set at "**Fire**" and taps 3 on the buttock to indicate that the gun is ready to fire.

183. *Duties of 5.*—5 is responsible for the preparation and supply of ammunition:—

(a) He does not remove the cups from the cartridges.

(b) If “Charge super plus” is ordered, he places the capsule containing the incremental charge in the mouth of the cup.

**Super charge plus increment must not be fired with HE or HESH shell.**

184. *Duties of 6.*—6 is responsible for the movement of the trail, and for assisting in the passage of orders and reports between 1 and 3 by repeating any order or report which has not been received or has been wrongly repeated.

His aim in moving the trail is to avoid unnecessary movement and yet to ensure that, by the time the gun is loaded and ready to fire, the target will be correctly placed in the sights, *ie*, for a crosser, the gun will be ahead of the target, and for a stationary or head-on tank, the gun will be on the target (para 200).

He ensures that he has recognized the target indicated by 1. If he is uncertain, he reports “Target lost”. If 1 indicates a fresh target without returning to the trail, 6 directs the gun at the target and orders “On”.

If 3 reports “Target lost”, 6 directs the gun at the target and orders “On”. If 6 cannot see the target, he reports “Target lost” to 1.

## SECTION 52.—APPLICATION OF FIRE

185. The effective application of fire depends on:—

(a) correct initial orders by 1, including a clear indication of the target;

(b) correct choice of initial range and lead by 1;

- (c) accurate laying by 3 ;
- (d) correct observation by 1 and accurate corrections if required ;
- (e) good drill by the remainder of the detachment.

186. *Initial orders.*—In order to quicken drill and to ensure that errors or omissions are more easily detected, orders are given by 1 in a standard sequence:—

- (a) “**Target**” or “**Fresh target**”.—To indicate the beginning of a shoot. If the bulk of the target is not visible, “**Hull down**” will be added, eg, “**Target—hull down**”.
- (b) *Range*.—To guide 3 and 6 in looking for the target and to let 3 set his sights in advance.
- (c) *Description of target* (if required).—To ensure that 3 and 6 recognize the target.
- (d) *Lead*.—To indicate the graticule or sight setting required.
- (e) “**Traverse**” (if required).—To indicate that the target is stationary or head on, and that 3 is to lay using the traversing gear. If this order is omitted, 3 does not use the traversing gear.
- (f) “**On**”.—To indicate to 3 and 6 that the gun is pointed at the target.
- (g) “**Fire**”.—To indicate to 3 that he is to fire as soon as the gun is correctly laid.

187. *Initial range.*—1 orders the estimated range to the target.

188. *The form of range orders.*—All ranges are ordered in yards, eg, “**Four hundred**” or “**Five fifty**” and are the actual ranges which 3 is to set on the range scale plate.

189. *Description of target.*—No description need be given when the target is obvious. When a description is required it should be brief and the most obvious feature should be named first, *eg*:—

Direction of movement:—

“*Moving right*”                      “*Head on*”

Position or size of group:—

“*Close group*”                      “*Small group*”

Position of tank in group:—

“*Front tank*”                      “*Last tank*”

“*Second from left*”

190. *Indication by sectors or reference objects.*—When 1 cannot return to the trail he will indicate the direction of the target to 3 and 6, by using the sectors and, if necessary, angles right or left of the reference objects, *eg*:—

“**Fresh target, hull down, 600**”.

“**Right sector. Reference house, right 4 degrees**”.

or

“**Fresh target, 400**”.

“**Right sector. Large group. Front tank**”.

191. *Initial lead.*—For direct crossing targets moving at speeds of 10, 20 or 30 miles per hour, 1 orders leads of 1, 2 or 3 respectively. These leads are approximately correct for charge 3, super or super plus increment.

For diagonal crossers 1 orders half the above leads, and for stationary or head on targets he orders “**Zero**” although a small lead may sometimes be required to allow for wind.

192. *The form of lead orders.*—All leads are ordered in units or fractions, *eg*, “**Right one**”, “**Left a half**” or “**Right a quarter**”.

When the dial sight is in use, a lead of "**Right one**" is set on the slipping scale as "30'" and a lead of "**Left one**" is set on the slipping scale as "359°30'".

Each lead cancels the previous lead, and 3 sets the open sight or dial sight at the last lead ordered or lays with the telescope using the graticule or fraction corresponding to the lead ordered.

193. *Observation of fire.*—1 will observe the path of the tracer at the target, and not the fall of the shot. Wrong deductions may be made if the tracer is observed before or after passing the target.

194. *Corrections.*—The aim is to hit with the first round. If the first round misses, either range or lead must be altered at once with the aim of hitting with the second round.

Except for a short round it will seldom be possible to judge the range of a round which is incorrect for line. 1 should therefore normally ensure that the line is correct before altering the range.

If a round misses wildly, a bold correction must be ordered. In all other cases, the rules of paras 195 and 196 apply.

195. *Corrections to lead.*—If a round misses to the right or left, 1 orders a fresh lead. The alteration required depends on the range, and on the width presented by the target.

The correct alterations in lead for targets between 400 and 600 yards are as follows:—

Direct or diagonal crossers	..	..	1
Head on targets	..	..	$\frac{1}{2}$
Hull down targets	..	..	$\frac{1}{4}$

These alterations in lead should be doubled for targets at ranges under 400 yards, and halved for targets at ranges over 600 yards. It is abnormal for 25-prs to engage tanks with direct fire at ranges over 600 yards.

If a lead finer than a quarter is required, the order is "**Zero right or left) edge**". This means that 3 lays on the edge of the target as ordered. To revert to the normal (central) point of aim, 1 orders "**Centre**".

196. *Corrections to range.*—If a round passes above or below the target 1 orders a new range, making an alteration of 200 yards.

If this alteration changes a miss above into a miss below or vice versa, he alters the range by 100 yards.

When engaging hull down targets, he may finally require alterations of less than 100 yards.

### SECTION 53.—ANTI-TANK LAYING

197. *Point of aim.*—The point of aim is the centre of the visible mass of the target, except when "**Right (or left) edge**" has been ordered.

198. *Ranges.*—All ranges are set on the range scale plate exactly as ordered.

When charge super or charge super plus increment is ordered, 3 sets the range reader so that the dot cuts the graduations of the scale appropriate to the shell and charge ordered and reports "**AP (or HESH) charge super set**" or "**AP charge super plus set**".

199. *Leads.*—When the telescope is in use, the graticule ordered is laid on the point of aim.

When the open sight is in use, the lead is set on the sight exactly as ordered.

When the dial sight is in use, the lead is set on the slipping scale, using 30 minutes to represent one unit of lead.

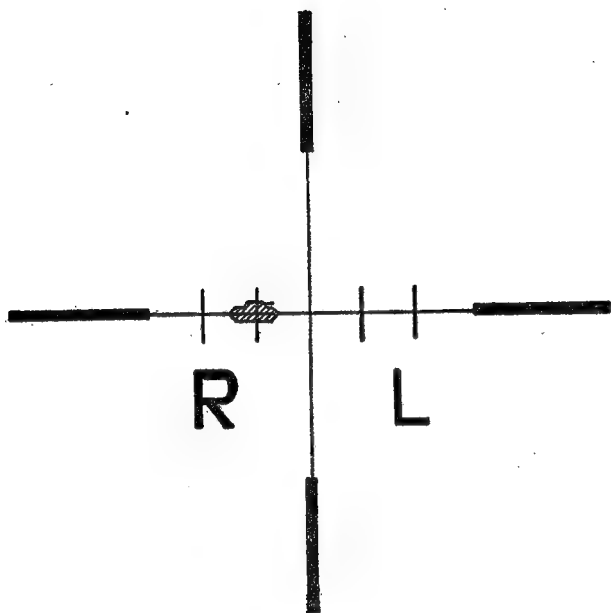


FIG 3—The No. 41 sighting telescope

The graticules are units of lead. The figure shows the correct point of aim for "Right 1". Note that the gun will be laid at the right of the target, since the main vertical graticule gives the line in which the gun is laid.

200. *Movement of the trail.*—The traversing gear must be used when laying on stationary or head on targets, but is unsuitable for following the movement of direct or diagonal crossers.

There are, therefore, two distinct drills as follows, of which the second is always used unless 1 orders **"Traverse"**:—

(a) *Stationary or head on targets.*—1 orders **"Traverse"**. 3 lays for line using the traversing gear. If the traverse becomes expended, 3 orders **"Target right (or left)"** and immediately brings the traversing gear to zero. 6 moves the trail to direct the gun at the target.

(b) *Direct or diagonal crossers.*—1 omits the order **"Traverse"**, or if **"Traverse"** is already in force, orders **"Stop traversing"**. 3 does not use the traversing gear. 6 moves the trail to direct the gun ahead of the target, and the movement of the target then brings it into the correct alignment.

If the target crosses the correct alignment before 3 is ready to fire, 3 orders **"Target right (or left)"** and 6 moves the trail to direct the gun once more ahead of the target.

Signals are not used for directing the movement of the trail when engaging tanks.

#### 201. *Sequence of laying.*—

(a) When the order **"Traverse"** has been given, 3 lays as follows:—

- (i) Having set the sights, he lays for elevation.
- (ii) Maintaining his lay for elevation, he lays for line, using the traversing handwheel, and fires when the sights are correctly aligned on the point of aim.

(b) When the order **"Traverse"** has not been given or has been cancelled by **"Stop traversing"**, 3 lays as follows:—

- (i) Having set the sights, he lays for elevation.
- (ii) He maintains his lay for elevation and fires when the motion of the target has brought the point of aim into the correct alignment.

#### SECTION 54.—ANTI-TANK GUN DRILL

202. On the order from the GPO:—

**"Tank alert, AP (or HESH) charge ..."** 1 orders **"Load"**.

3 repeats the ammunition and charge **"AP (or HESH) charge ..."**, sets the range reader and the drift scale plate\* and reports **"Set"**.

4 loads and taps 3.

1 orders the elevation previously laid down by the GPO for opening fire.

3 repeats the elevation, sets the range scale plate as ordered, reports **"Set"** and opens the sight port cover.

1 orders **"Dial sight zero"**.

3 sets the main scale at zero, slips the slipping scale to zero, sets the cowl at the setting recorded on the shield **"for firing"** and reports **"Zero set"**.

3 decides which is the best sight to use in the prevailing light conditions. He sets the traversing gear at zero.

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\* When charge super plus is ordered, the drift scale plate will be set as for charge super.

203. On the order from the GPO :—

**“Tanks . . . sector (or . . . rear)”.**

**1** selects his target, estimates the range and orders:—

**“Target .. (elevation)”.**

**3** repeats “ (elevation)”, sets the range scale plate and reports **“Set”**. **6** takes up a position near the traversing handspike.

**1** mans the traversing handspike and directs the gun at the target, at the same time ordering the description of the target, if necessary, and the lead.

**3** repeats “.. (lead)” and if using the open sight or dial sight, sets the lead and reports **“Set”**.

**1** orders **“Traverse”** if the tank is stationary or head on. **3** repeats **“Traverse”** if ordered.

**1** orders **“On”** when the gun is directed at the target, and leaves it directed at the target long enough for **3** and **6** to recognize the target. He then directs the gun ahead of the target if it is a crosser. **4** checks the safety catch and taps **3**.

**6** mans the traversing handspike.

**1** takes up his position for observation.

**3** lays.

204. On the order from the GPO **“.. engage”** or as soon after that order as he is ready, **1** orders **“Fire”**.

**3** fires as soon as the gun is correctly laid, immediately checks the setting of the range scale plate and re-lays.

**6** moves the trail if necessary.

**4** reloads, and taps **3**.

**1** observes and orders any correction necessary.

**3** repeats any correction ordered, sets the sights, reports **“Set”** and relays.

**3** fires as soon as the gun is loaded and correctly laid.

## SECTION 55.—ANTI-TANK MISFIRE DRILL

205. The principles of misfire drill are described in Sec 31. The anti-tank misfire drill is as follows.

206. If the gun fails to fire, 3 orders "**Check the breech**" and continues to lay.

If the target is a crosser, 6 directs the gun once more ahead of the target.

2 checks the breech in the normal way and reports "**Recocked**" or "**Breech correct**".

As soon as the gun is again correctly laid, 3 again attempts to fire.

If the gun again fails to fire, the same drill is carried out again, except that when 2 reports "**Recocked**" or "**Breech correct**", 3 does not pull the firing lever.

After two reports of "**Breech correct**", 6 orders "**Emergency firing**". 3 orders "**Stand by**" just before the gun is correctly laid, followed by "**Fire**" when the gun is laid. 4 fires at 3's order.

After two reports of "**Recocked**", 6 reports to 1 "**Misfire**". During training he waits one minute and orders "**Cartridge only—unload**". He then carries out 1's normal examination of the primer and 1's normal subsequent action. As soon as the gun is ready, the action is continued.

When in action in the face of the enemy the drill is the same except that the pause of one minute will **not** be made.

## SECTION 56.—PREPARATIONS AND DRILL WHEN THE PLATFORM IS NOT AVAILABLE

207. When the platform cannot be used, a spade bed should be dug at "**Prepare for tanks**", in an arc of a circle, and the spade box should be fitted so that the gun can be fired without the spade becoming embedded.

208. If the ground is soft or if there has been no time to dig a spade bed, dragropes should be hooked to the trail at "**Tank alert**" and the spade should be cleared if necessary.

209. The drill is the same as the normal anti-tank drill, except that if 6 is unable to move the trail, he orders "**Dragropes trail right (or left)**". 2 (right) or 5 (left) then heaves on the dragrope to assist 6 in moving the trail.

## CHAPTER 4

### LAYING

#### SECTION 57.—THE DIAL SIGHT

##### Notes

210. The dial sight has two horizontal scales graduated in opposite directions.

(a) *The main scale.*—This is the black and white scale of degrees on the upper face of the dial plate and the corresponding scale of minutes on the left micrometer. It measures the clockwise angle between the line in which the gun is laid and the aiming point on which the dial sight is laid.

The main scale is used for laying the gun in the centre of arc, for recording and checking the centre of arc and also during the drill for changing from one GAP to another.

The accuracy of all subsequent laying depends on the accuracy of laying the gun in the centre of arc and of recording and checking the centre of arc. In order to ensure that the main scale measures true hori-

zontal angles during these important operations, the following conditions must be satisfied :—

- (i) The cross-level bubble must be in the centre of its run.
- (ii) The sight clinometer must be set at zero degrees zero minutes and its bubble must be in the centre of its run.

Provided these conditions are satisfied, the settings of the drift scale plate and range scale plate are immaterial.

- (b) *The slipping scale.*—This is the metal scale of degrees on the slipping skin round the outer vertical face of the dial plate and the corresponding scale of minutes on the slipping skin of the right micrometer.

The slipping scale is used as follows in order to measure bearings :—

- (i) *To slip the slipping scale.*—This is an operation which is performed only by 1 (except as described in para 202). The aim is to ensure that the slipping scale reads the bearing ordered when the gun is laid on the centre of arc and the dial sight is laid on the GAP in use. 1 loosens the clamp of the degree scale, moves the scale independently of the dial plate to the reading required and re-clamps it. He then holds the left micrometer head to ensure that the reading of the main scale is not altered, loosens the clamp of the right micrometer scale, slips the scale to zero and re-clamps it.

- (ii) *To set the slipping scale.*—This is the operation by which all switches are set on the sight during a shoot. 3 moves the dial plate and slipping scale clamped together as one unit and sets the scale at the bearing ordered. When 3 then re-lays on the GAP the bearing of the gun is the same as that set on the slipping scale.

211. *The cowl.*—For convenience during indirect laying, the cowl is provided with a micrometer by means of which the image of the GAP can be moved up or down into the centre of the field of view.

During direct laying, when the dial sight is used for laying for elevation as well as for line, the cowl must be set at the reading recorded on the shield "for firing". If no reading has been recorded, the cowl must be set at zero.

## SECTION 58.—SIGHT SETTING

### Notes

212. *The use of quick release mechanisms.*—When the quick release mechanisms are used (normally for moving scales through angles greater than ten degrees) no attempt will be made to re-engage the gears at the exact setting ordered, and the micrometer will be turned through at least one complete turn to ensure that the gears have re-engaged correctly.

213. *Final motions.*—In order to avoid errors due to backlash, the final motions of certain gears must always be made in one direction. The restrictions in respect of sight setting are as follows:—

(a) *Dial sight micrometer.*—No restrictions.

(b) *Dial sight cowl.*

For indirect laying.—No restriction.

For direct laying.—Set the micrometer at the reading "for firing" making the final movement one of depressing the line of sight.

(c) *Sight clinometer*.—No restriction.

(d) *Range scale handwheel*.—Turn the top of the wheel to the right last.

## Drill

214. *To set the angle to an aiming point*.—On the order:—

“Aiming point” “.. degrees .. minutes” ..

or

“Aiming point director”

“No. .. degrees .. minutes”.

3 uses the quick release mechanism if required, and having re-engaged the gears, sets the main scale as follows:—

He turns the micrometer heads until the main scale is reading the number of degrees ordered and the left micrometer drum is reading zero minutes.

He then turns the top of the left micrometer towards him until the left micrometer drum is reading the number of minutes ordered.

215. *To set a bearing*.—On the order “Bearing .. degrees .. minutes”.

3 uses the quick release mechanism if required, and having re-engaged the gears, sets the slipping scale as follows:—

He turns the micrometer heads until the slipping scale is reading the number of degrees ordered and the right micrometer drum is reading zero minutes.

He then turns the top of the right micrometer away from him until the right micrometer drum is reading the number of minutes ordered.

216. *To set a switch from the current line*.—On the order:—

“More (or less) .. degrees .. minutes”,

3 turns the right (or left) micrometer head and counts the degrees and minutes on the right micrometer drum. When "**More**" is ordered, he turns the top of the right micrometer away from him with his right hand, and when "**Less**" is ordered, he turns the top of the left micrometer towards him with his left hand, *ie*,

**MORE=AWAY**

**LESS=TOWARDS**

In no circumstances will the quick release be used when setting switches from the current line.

217. *To set an angle of sight.*—On the order:—

**"Angle of sight . . degrees . . minutes elevation (or depression)"**,

3 uses the quick release mechanism if required, and having re-engaged the gears, sets the clinometer as follows:—

He turns the micrometer until the degree scale is reading the number of degrees ordered and the micrometer drums are reading zero minutes.

218. For angles of elevation he then turns the top of the micrometer to the right until the rear micrometer drum is reading the number of minutes ordered.

For angles of depression he turns the top of the micrometer to the left until the forward micrometer drum is reading the number of minutes ordered.

219. *To set an elevation on the range scale plate.*—

When an elevation is ordered, except at clinometer laying, 3 sets the elevation on the range plate as follows, making the final movement by turning the top of the range scale handwheel to the right, *ie*, by increasing the elevation set on the plate:—

(a) *When elevations are ordered in yards.*—He turns the range scale handwheel until the elevation ordered is behind the spot of the range reader.

The graduations of the range scale plate are in hundreds of yards. The correct settings of the spot of the range reader for hundreds, twenty-fives, fifties and seventy-fives of yards are shown in Fig 4.

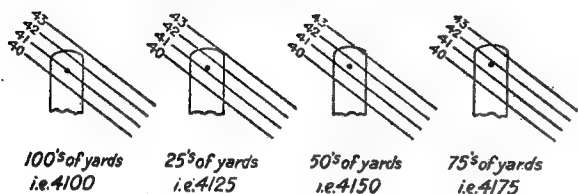


FIG 4—Range settings

- (b) *When elevations are ordered in degrees and minutes.*—He turns the range scale hand-wheel until the elevation ordered is read on the TE scale against the arrow of the TE reader plate.

220. *To set an elevation on the field clinometer.*—

When “**Clinometer laying**” is ordered, 1 applies his gun correction and the correction for index error of the clinometer to all elevations ordered (para 296), and sets the clinometer as follows:—

- (a) *To set the degrees.*—1 presses in the plunger and moves the arm until the reader is opposite the required graduation on the degree scale. He then releases the plunger and checks the setting.
- (b) *To set the minutes.*—Still working on the same side of the clinometer, 1 unclamps the slider and moves it along the arm until the arrow is opposite the required graduation. He then clamps the slider and checks the setting.

## SECTION 59.—CHOICE OF GAPs 1 AND 2

221. 1 is responsible for choosing the GAPs. If suitable GAPs are not available he must report this fact to the GPO.

222. The requirements of a good GAP are :—

- (a) It must be conspicuous and unmistakable.
- (b) It must have a definite edge on which to lay.
- (c) Its position must be such that it can be used for all targets within the arc of fire of the gun and such that it is not likely to be obscured by the muzzle of the gun at high elevations, or by the detachment or by the other guns or their detachments.

223. GAP 1 must satisfy the requirements of a good GAP and in addition must be as far distant as possible.

224. GAP 2 must satisfy the conditions of a good GAP and in addition must be near enough to ensure that it will not be obscured by changes in the weather conditions, but not so near that inaccuracies in line will result from movement of the gun on its platform. 300 to 600 yards may be taken as a guide to distance, and the most suitable position is to the rear or to the left front.

## SECTION 60.—POINT OF AIM

### Notes

225. At indirect laying, 3 lays the vertical cross wire of the dial sight as follows, using the traversing handwheel :—

- (a) *When using an aiming point.*—On the left edge of the aiming point, unless otherwise ordered.

- (b) *When using the Mark 5A paralleloscope.*—On whichever line of the paralleloscope appears parallel to the vertical crosswire.
- (c) *When using aiming posts.*—On the posts, provided they appear in line. Otherwise, on the number on the far crosshead which appears in line (or most nearly in line) with the corresponding number on the near crosshead (Fig 5).

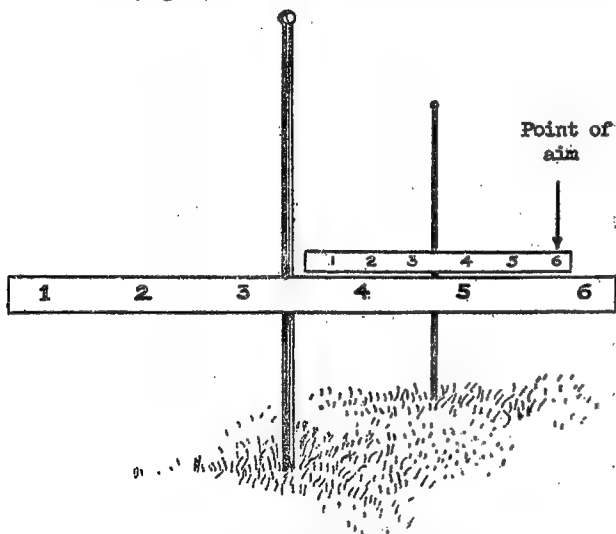


FIG 5—The use of crossheads

Owing to movement of the dial sight, the posts are no longer in line. The numbers most nearly in line are the two numbers "6". The correct point of aim is the "6" on the far crosshead.

226. At direct laying, the point of aim is the centre of the visible mass of the target, unless "**Right** (or **left**) edge" has been ordered.

At direct laying with the telescope, 3 lays the graticule ordered on the point of aim.

At direct laying with the open sight, 3 keeps his eye so placed that the tip of the foresight is in line with and in the centre of the shoulders of the U of the hind sight and then lays the tip of the foresight on the point of aim.

At direct laying with the dial sight, 3 aligns the vertical and horizontal cross wires on the point of aim.

## SECTION 61.—SEQUENCE OF LAYING

### Notes

227. The sequence of laying is a drill which must be rigidly followed. If an incorrect sequence is followed, one adjustment may upset the previous ones and the lay may be incorrect. Thus, in indirect laying, if the sight is cross levelled after (instead of before) laying accurately for line, the dial sight will be deflected off the aiming point and the gun will be incorrectly laid.

228. *Final motions.*—In order to avoid errors due to backlash, the final motions of certain gears must always be made in one direction. The restrictions in respect of laying are as follows:—

(a) *Cross levelling.*—No restriction.

(b) *Laying accurately for line.*—Normally no restriction. If for any reason the gun traverses more easily in one direction than the other, the final motion should be in the direction in which most resistance is felt.

(c) *Laying accurately for elevation.*—The top of the elevating handwheel will be turned to the left last, *ie*, the final movement will be one of depression. If the layer over-runs the correct position he will elevate by at least two complete turns of the handwheel and then depress until the lay is correct.

The above restrictions do not apply to anti-tank shooting.

229. *Laying roughly for line.*—This means laying for line until the sight is judged to be within 30 minutes of the target or aiming point.

If 1 correctly measures switches and moves the trail, 3 will find on looking through the sight that it is already laid roughly for line. If not, 3 will direct the movement of the trail as described in Sec 62.

Any large movement after 1 has measured the switch and moved the trail indicates an error by 1 or 3; 1 will investigate the error and ensure that the lay is correct.

### Drill for normal indirect laying

230. Having set the sights, 3 lays as follows:—

- (a) He lays roughly for elevation by elevating until the bubble of the sight clinometer runs to the front and then depressing by at least two turns of the handwheel until the bubble is nearly in the centre of its run.
- (b) He lays roughly for line.
- (c) He crosslevels the sight.\*
- (d) He lays accurately for line.\*
- (e) He lays accurately for elevation by depressing until the bubble of the sight clinometer is in the centre of its run.

### Drill for clinometer laying

231. Having set the sights (other than the field clinometer) 3 lays as follows:—

- (a) He lays roughly for elevation by elevating until the bubble of the field clinometer runs to the front and then depressing by at least two complete turns of the handwheel until the bubble is nearly in the centre of its run.

---

\* When laying for high angle firing the operation of laying accurately for line is apt to disturb the cross-level bubble. 3 must traverse and centralize the cross-level bubble alternately until the cross-level bubble is central and the gun is laid accurately for line.

(b) He brings the sight clinometer bubble to the centre of its run by means of the range scale handwheel.

(c) He lays roughly for line.\*

(d) He cross-levels the sight.\*

(e) He lays accurately for line.

(f) He lays accurately for elevation by depressing until the bubble of the field clinometer is in the centre of its run.†

### Drill for direct laying

232. Having set the sights, 3 lays as follows:—

(a) He lays roughly on the target for line and elevation using the sight ordered.

(b) He cross-levels the sight.

(c) He lays accurately for line on the point of aim.

(d) He lays accurately for elevation by depressing on to the point of aim.

The above drill does not apply to anti-tank laying, for which, see para 201.

## SECTION 62.—TO DIRECT THE MOVEMENT OF THE TRAIL

233. The following table shows the signals used for directing the movement of the trail:—

Order and signal	Action
“Trail right (or left)”— Arm extended towards the traversing handspike and palm of the hand turned in the direction required.	1 or 6 mans the traversing handspike and moves the trail steadily until the “Halt” signal is given.
“Halt”—Fist clenched.	1 or 6 stops the movement and remains at the traversing handspike.
“Take post”—Sharp tap on the buttock with the palm of the hand.	The detachment take up their positions in action.

\* See footnote on page 88.

† The sight clinometer bubble will not be exactly in the centre of its run. This does not affect the accuracy of the lay, since the elevation is measured by the field clinometer. The aim of levelling the sight clinometer is to keep the sight upright and to apply the correct allowance for drift.

## SECTION 63.—TO CHANGE FROM ONE GAP TO ANOTHER

### Notes

234. GAP 1 will always be used for indirect laying unless it becomes obscured or the GPO orders an alternative method.

If GAP 1 becomes obscured, 3 will report this fact to 1 who will order the appropriate alternative method. If GAP 1 later becomes visible, 1 will change back at the first convenient opportunity.

### Drill

235. On the report "**GAP 1 obscured**" or on the GPO's order "**Aiming posts (or Parallelosopes)**":—

1 notes the present reading of the slipping scale and orders 3 to report the reading as a check.

1 orders "**GAP 2 (or Aiming posts or Paralleloscope)**".

3 sets the main scale at the centre of arc reading for the aiming point ordered, as recorded on the plate.

1 checks the setting and slips the slipping scale to the bearing of centre of arc as previously ordered.

1 then orders the reading of the slipping scale as originally noted, "**Bearing .. degrees ... minutes**".

3 sets the slipping scale as ordered and lays on the aiming point ordered.

## SECTION 64.—TO RE-POSITION THE SLIPPING SCALE

### Notes

236. If the slipping scale is correctly clamped by 1 it should not slip, but if it is found to have slipped it can be re-positioned, using the following drill.

**Drill**

237. 1 orders "GAP .. (or Aiming posts or Paralleloscope)".

3 sets the main scale at the centre of arc reading for the aiming point ordered, as recorded on the plate.

1 checks the setting and slips the slipping scale to the bearing of centre of arc as ordered.

1 obtains the current bearing from either the GPO or the dial sight of the next gun. He orders this as, "Bearing .. degrees .. minutes".

3 sets the slipping scale as ordered and lays on the aiming point ordered.

### SECTION 65.—TO COMPLETE A DEFERRED CENTRE OF ARC RECORD

**Notes**

238. If "Defer second method" is ordered, or if fire orders are received during the recording of centre of arc, 1 will report "No. .. bearing .. degrees .. recorded" as soon as the record to GAP 1 is complete.

The record of the main scale reading from the centre of arc to GAP 2 will be completed without further orders at the first opportunity, eg, at the first period of "Stand easy". Before beginning this operation, 1 must note the line, angle of sight and range at which the gun is laid, in order that the gun can be left laid as last ordered after the operation is complete.

**Drill**

239. 1 records the readings of the slipping scale, sight clinometer and range scale plate. He then orders 3 to report the readings and compares them with his record. Having corrected any discrepancy, 1 orders the gun to be laid in the centre of arc bearing by ordering:—

"Bearing .. degrees, angle of sight zero".

3 sets the sights and lays on GAP 1.

As soon as the gun is laid, 1 checks that the main scale reading agrees with the reading to GAP 1 as recorded on the plate.

The drill for recording GAP-2 is then carried out in the normal manner.

1 then orders the gun to be relaid as last ordered, *ie*, he orders:—

“Bearing .. degrees .. minutes”.

“Angle of sight ... degrees .. minutes elevation (or depression)”.

“ .. (elevation)”.

3 sets the sights and re-lays on GAP 1.

## SECTION 66.—TO LAY USING AIMING POSTS OR PARALLELOSOPES

### Notes

240. The use of a close aiming point may be essential because of poor visibility or restricted field of view.

With a close aiming point, errors for line may be introduced as the result of movement of the dial sight.

Aiming posts or parallelosopes provide a close aiming point free from this objection, provided the correct point of aim is used, as described in para 225.

241. Movement of the carriage as a whole due to firing may move the dial sight outside the scope of the crossheads or paralleloscope board. If 1 finds that this is tending to happen, he will inform the GPO who will at the first opportunity order the gun to be relaid in the bearing of centre of arc and the aiming posts or paralleloscope set up afresh in the normal manner.

242. With aiming posts planted at a main scale angle of 315 or 135 degrees, the 25-pr can be switched 65 degrees on either side of the centre of arc before the dial sight moves outside the scope of the cross-heads.

To cover wider switches, the aiming posts should be set up at 180 or 360 for switches to the right of centre of arc and at 90 or 270 degrees for switches to the left of centre of arc.

243. For normal arcs of fire, with the paralleloscope at 135 degrees, switches to the right and left of centre of arc can be obtained as follows before the line of

sight from the dial sight moves outside the scope of the board(s):—

- |                             |    |              |
|-----------------------------|----|--------------|
| (a) Using one board.—Right  | .. | 55 degrees.  |
| Left                        | .. | 85 degrees.  |
| (b) Using two boards.—Right | .. | 55 degrees.  |
| Left                        | .. | 155 degrees. |

The switch to the right of centre of arc shown in (a) and (b) above, can be increased by 15 degrees when the dial sight case is removed from the shield.

244. When laying at large angles of sight, the paraloscope must be set up at 180 degrees.

245. When switches from centre of arc greater than those shown in para 243 are expected, the paralleloscope should be set up as follows:—

- (a) For bearings to the right of centre of arc—at 180 degrees.  
(b) For bearings to the left of centre of arc—at 90 degrees.

246. The centre of the board should be used as the laying mark for setting up in the circumstances referred to in paras 244 and 245.

The application of a very large switch may move the dial sight outside the scope of the crossheads or parallelscope board. If this happens, 1 will inform the GPO, who will order the gun to be relaid in the centre of arc and the aiming posts or parallelscopes set up afresh in a more suitable position.

## SECTION 67.—NIGHT LAYING

## Notes

247. Illumination is required for the aiming point, and for the graticules, scales and bubbles.

A window is provided in the dial sight for the illumination of the graticule. In No. 7A to 7C dial sights, this window is conveniently placed at the side of the eyepiece. In the No. 9 dial sight, the window is above the dial plate and is, therefore, moved round as the dial plate is rotated, thus making illumination awkward in certain positions of the aiming point. Pending the provision of the illuminating apparatus

for which the No. 9 dial sight is designed, illumination of the graticule should be improvised, using a wandering lead or an electric torch.

3 is provided with a forehead lamp for the illumination of scales and bubbles, thus leaving his hands free.

248. The GPO is responsible for illumination of the troop pickets while 1 is responsible for the illumination of the aiming posts or the paralleloscope if ordered.

The use of a single aiming post is liable to lead to errors in line unless the platform is firm. If the platform is firm, errors in line due to movement of the dial sight on switching will be reduced to a minimum if the aiming post is planted at a main scale angle of 315 or 135 degrees, but a single aiming post should never be used if one of the other methods is possible.

The paralleloscope is the most suitable close aiming point. It can conveniently be illuminated by using a shaded hurricane lamp. Alternatively, an electric torch may be used, switched on as required at 3's order by one of the ammunition numbers.

## SECTION 68.—TO SET THE FUZE INDICATOR

### Notes

249. 1 is responsible that the MV and range readers of the fuze indicator are correctly set at the MVs of the gun for the corresponding charges and propellant natures.

1 should occasionally check the setting of the fuze indicator, and should always check the first setting in any series.

### Drill

250. When time and percussion fuzes are ordered, 6 obtains the plate for the charge ordered. On the order "**Corrector . .**", 6 sets the corrector scale to the figure ordered and clamps it. When the elevation is ordered, 6 sets the reader at the elevation, clamps it, reads the fuze setting nearest the arrow of the reader, and calls out the setting loud for 1, 4 and 5 to hear.

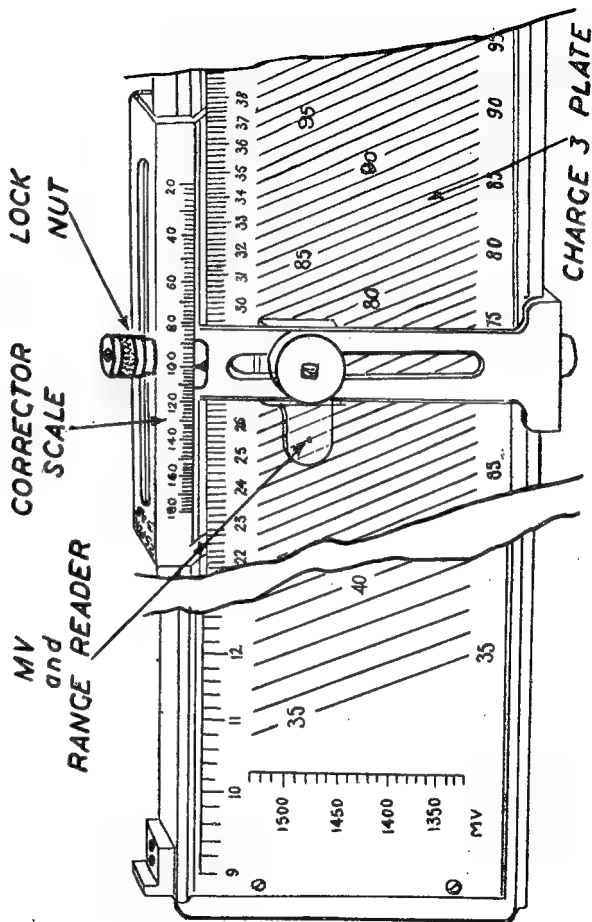


Fig 6—Fuze indicator

## SECTION 69.—TO SET THE GUN RULE

## Notes

251. **1** is responsible that the MV corrector scale readers of the gun rule are correctly set at the MVs of the gun for the corresponding charges and propellant natures. He should occasionally check the setting of the gun rule when in use.

**2** is responsible for operating the gun rule.

## Drill

252. When incremental charges are ordered, **2** ensures that the slide corresponding to the charge ordered is inserted in the gun rule. He sets the reading arrow against the arrow of the MV corrector scale reader for the charge ordered, clamps the slide and reports "**Charge .. plus .. increment(s) set**".

When the elevation is ordered, **2** repeats the elevation, sets the reader at the range ordered, and reports "**Set**". He reads the highest tangent elevation visible to the left of the reader and calls it out loud enough for **1** and **3** to hear.

**1** checks the charge setting and tangent elevation reading on the gun rule:—

- (a) Before the first round of any shoot is fired.
- (b) When a change of charge is ordered.
- (c) Periodically during a shoot.

## CHAPTER 5

## PREPARATION OF AMMUNITION

## SECTION 70.—CARE OF AMMUNITION

253. Ammunition must be kept clean and must be protected from damp and from extremes of temperature.

During loading and preparation of ammunition, care must be taken that the fuze is not damaged by being struck against any hard object.

The preparation of ammunition for return to the vehicles is described in Sec 44.

## SECTION 71.—TO SORT AMMUNITION

254. To facilitate the preparation of ammunition during a shoot, it is important that ammunition in trailers, vehicles and dumps is sorted into groups as follows:—

(a) *Projectiles are sorted.*—

Firstly, by nature of shot or shell.

Secondly, by nature of fuze.

Shell fuzed with time and percussion fuzes are further sorted by lot numbers or colour markings of the fuze (para 257).

(b) *Cartridges are sorted.*—

Firstly, by nature of propellant.

Secondly (if time permits), by propellant lot numbers.

Details are marked on all ammunition boxes, and ammunition numbers are responsible for keeping similar types of ammunition together. The markings on the ammunition itself are described below in so far as these markings concern the ammunition numbers.

255. *Projectiles.*—The different natures of projectile are distinguished by the colour of the body. Coloured rings on the head and coloured bands round the body are used to denote sub-divisions within any one nature. Only the essential details are given below:—..

(a) HE .. .. Buff body. Letters and figures in black.

(b) Smoke .. .. Light green body. Letters and figures in black.

- |                    |   |
|--------------------|---|
| (c) Coloured smoke | Light green body with colour of the smoke stencilled in $\frac{1}{4}$ -inch white letters, eg, "RED".   |
| (d) Coloured flare | Body white. Letters and figures in black. Colour of flare stencilled in black.  |
| (e) Chemical       | <p>.. Light grey body.</p> <p>Green ring(s) and green stencilling indicate a casualty producing agent.</p> <p>Red ring(s) and red stencilling indicate a harassing agent.</p> <p>One ring indicates a non-persistent agent and two rings indicate a persistent agent.</p> |
| (f) Star           | <p>.. .. White body with black star at shoulder. Markings in black.</p>   |
| (g) AP shot        | <p>.. .. Black body with markings in red or white.</p>  |

256. *Fuzes*.—The different natures of fuzes are shown in Figs 7 and 8. The preparation of fuzes for firing, and the safety precautions to be observed before firing, and before returning fuzes to the vehicles are described in Secs 73 and 75.

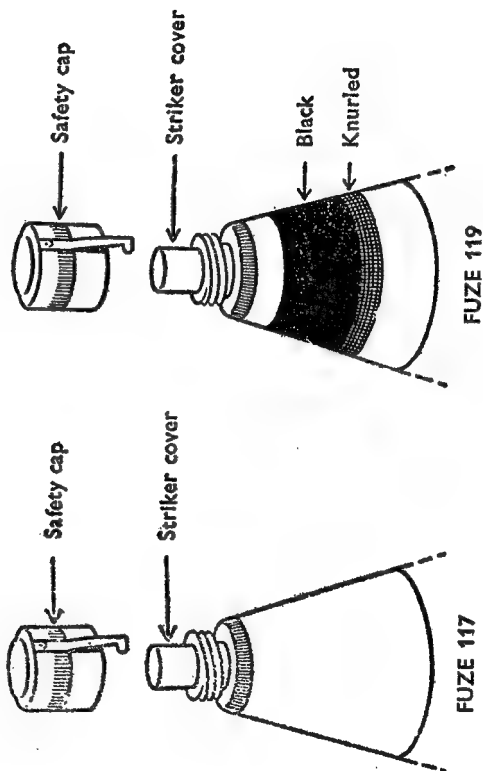


FIG 7—Percussion fuzes

257. *Time and percussion fuzes.*—In order to ensure effective airbursts, it is important to sort time and percussion fuzes by lot numbers whenever possible, since different lots may give different times to point of burst.

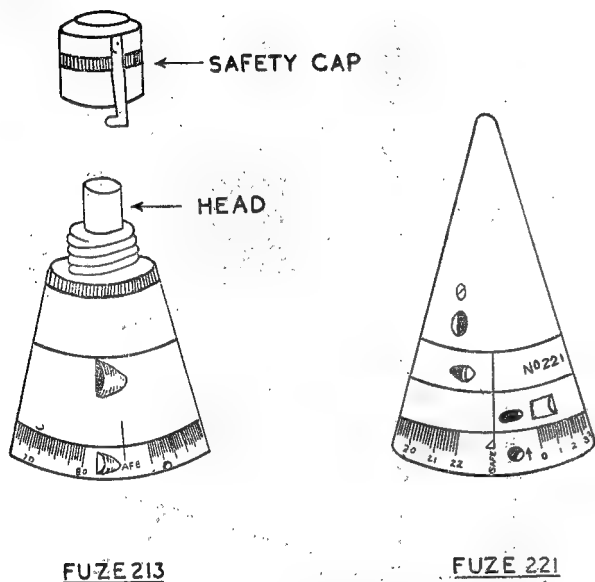


FIG 8—Time and percussion fuzes

258. *Cartridges.*—Different natures of propellant cause differences in the ranging of the shell, and it is important that for observer fire the cartridges used during any one shoot are all of one propellant nature, and so far as is possible of one propellant lot number. For programme shoots one nature of propellant and mixed lots should be used.

If more than one nature of propellant is available on the gun position, the GPO's order for ammunition will include the nature of propellant to be used. As soon as one nature of propellant is expended or nearly expended, 1 reports to the GPO, *eg*, "No. .. NH expended".

The nature of the propellant and the lot number will be found stencilled on the ammunition box, the cartridge case, and the bags containing the separate portions. The natures of propellant in use with the 25-pr are:—

W or WM	}	Charges 1 to 3.
NH 025		
NH <i>plus</i> FNH		
NQ(R) <i>plus</i> NQ		
AN		
WT or WMT	}	Charge Super.
NQ/S		

## SECTION 72.—FUZING OF SHELL

### VT fuzes.

259. The two types of shell suitable for use with VT fuzes are marked as follows:—

- (a) *Those suitable for use with VT fuzes only.*—Shell of this type will be stencilled with the name of the fuze for which they are designed, *eg*, "USE FUZE T97". Packages for shell will be marked, *eg*, "PLGD FOR FUZE T97".
- (b) *Those suitable for use with VT or with standard fuzes.*—Shell of this type will be marked with two vertical black stripes, diametrically opposed on the nose. The stripes are placed over the rings.

260. Each VT fuze is issued sealed in a metal container. There are 12 containers to a box and in each box is a special fuze key.

Some fuzes may be issued with a bakelite cover fitted to the base of the fuze in place of the auxiliary detonator which is then issued separately. **This cover must be removed and an auxiliary detonator fitted before the fuze is inserted in the shell. Both cover and auxiliary detonator have left-handed threads.**

261. Shell should not be fuzed with VT fuzes until immediately before they are required for use.

Shell fuzed with VT fuzes should not be loaded into vehicles. The fuze must be removed and the shell plugged with Plug No. 29 or fitted with an exploder and standard fuze for travelling.

VT fuzes must be handled with care. No fuze which has been subjected to excessively rough handling should be fired as it may result in a blind.

262. *To fuze shell suitable for use with VT fuzes only.*—

- (a) Remove the plug and washers from the shell.
- (b) Examine the cavity and screw threads and remove any loose luting.
- (c) Remove the fuze from its container and make sure that an auxiliary detonator is fitted (para 260). Place the copper washer on the fuze.
- (d) Screw the fuze into the shell, and tighten it with the special fuze key provided with each box of fuzes. If the fuze cannot be screwed fully home it must be removed and the fuze and cavity examined for damaged threads. Any attempt to force the fuze home by hammering the fuze key may damage the fuze and result in a blind.

263. *To fuze shell suitable for use with VT or with standard fuzes.*—

- (a) Remove the standard fuze from the shell.
- (b) Insert the hook of the special fuze key into the loop on the top of the exploder and withdraw the exploder.
- (c) Proceed as in para 262 (b), (c) and (d).

**SECTION 73.—TO PREPARE FUZES FOR FIRING****Notes**

264. The black safety cap of fuzes 117 and 213 must always be removed before firing. The black safety cap of fuze 119 must be removed before firing unless the ammunition ordered is "**HE 119 cap on**". Safety caps which have been removed will be returned as salvage.

265. During the preparation of fuze 117 and 119, 4 and 5 will examine the striker cover. If the striker cover is damaged, missing or excessively loose, the fuze will be set aside and reported to 1. Rotation or a slight up and down movement of the striker cover is acceptable, but marked up and down movement should not be accepted. Shell fitted with a fuze with a defective striker cover must not be fired since the fuze is liable to function prematurely as soon as the shutter has opened.

After the striker cover has been examined the black safety cap will be replaced, and will not again be removed until 4 obtains the shell for loading.

266. *VT fuzes*.—Some VT fuzes are issued with a piece of waxed paper fitted over the nose. This paper must be removed before firing. No attempt will be made to remove the normal wax coating of the upper portion of the fuze.

Apart from the above VT fuzes require no other preparation for firing.

267. Any fuze which appears to have been damaged in any way will be reported to 1 and will not be fired.

268. The setting for safety and for percussion with fuzes 213 and 221 is shown in Fig. 9. Fuze 221 will function as a time fuze at any setting between "0" and the highest setting. The setting "0" will burst the shell at or close to the muzzle.

Smoke shell may be fired at fuze "0", but on no account will **HE** shell be fired at fuze "0".

Fuze 213 incorporates a safety device which prevents the fuze functioning as a time fuze at settings lower than 1.6.

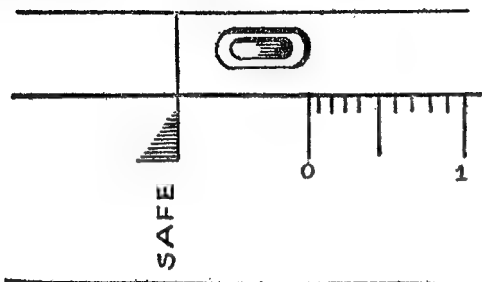


FIG 9—Fuze 213 or 221 set to "Safe" or "Percussion"

269. With fuze 221 the time ring is rotated using a fuze key until the line on the time ring is opposite the fuze setting ordered. In setting this fuze the movement will be one of decreasing the fuze setting, *ie.* a clockwise movement tending to tighten the fuze in the shell. The only exception to this rule is that a small increase in setting may be made when required, provided that the final movement is a clockwise one of decreasing the setting. With fuze 213, a fuze setter is used.

270. *To set the fuze setter.*—For large alterations, the main scale is rotated, using the quick release, to a position within one or two units of the setting ordered. The gears are then re-engaged, and the micrometer is turned through at least one complete turn until the main scale is reading the number of units ordered and the micrometer is reading the number of decimal points. The micrometer is used for alterations less than five units.

271. *To use the fuze setter.*—The fuze setter, having been set as ordered, is placed over the fuze and turned clockwise until it engages with the time ring. It is then turned back, anti-clockwise, about one-eighth of a turn and finally turned clockwise until its motion is stopped by the plunger engaging in the fixed slot. The fuze having thus been set, the fuze setter is removed.

#### SECTION 74.—TO PREPARE CARTRIDGES FOR FIRING

272. The first, second and third portions of the propellant charge are packed in red, white and blue bags respectively. The charges are made up as follows:—

Charge 1. RED portion only.

Charge 2. RED and WHITE portions.

Charge 3. RED, WHITE and BLUE portions.

If, during the preparation or checking of the cartridge, a broken bag or loose propellant is observed, the cartridge will not be used.

Bags will not be removed for examination since this process may cause them to break.

273. The charge is retained in the cartridge case during transit by a cardboard cup, which is removed during the preparation of the charge, but must be replaced before loading in order to ensure that all portions of the charge are in contact and that the first portion is in contact with the primer.

274. Portions of cartridges which are removed during the preparation of the charge, will be set aside. These portions can be used should the cartridges have to be made up to a higher charge. In making up cartridges to a higher charge, care must be taken not to mix different natures of propellant or lot numbers in the same cartridge. Remaining portions will be packed in an empty ammunition box, clearly marked and returned for salvage.

275. Intermediate charge increments are contained in striped red-and-white bags. When **"Charge 1 plus 1 increment"** or **"Charge 2 plus 1 (or 2) increment(s)"** is ordered, the cartridges are first prepared as for charge 1 or 2 and then the number of increments ordered is inserted.

276. Super charge is packed in separate cartridge cases, stencilled SUPER and with non-removable cardboard cups.

When **"Charge super plus"** is ordered, the capsule containing the super charge increment is placed in the mouth of the cup. **Super charge plus increment will be fired only with AP shot.**

277. In preparing cartridges, 5 and 6 will inspect the primer to see that it is screwed fully home.

#### SECTION 75.—TO PREPARE AMMUNITION IN ADVANCE

278. When it is known in advance that a number of rounds will be required for a fire plan or programme shoot, the fuzes and charges should be prepared before firing begins.

279. After time fuzes have been set they will be checked, and the shell will be stacked in groups, by fuze settings, each group being clearly marked with the fuze setting concerned.

In shell fuzed with fuze 117 or 119, the safety cap will be removed and the striker cover examined (para 265). After examination the safety cap will be replaced and the shell stacked with the safety cap on.

280. After the charges have been prepared, each cartridge will be checked by 1 (para 95) and marked with the number of the charge. The cups will then be replaced and the cartridges stacked in groups by charges.

281. The markings will be valid only for the shoot for which the ammunition was prepared.

282. Ammunition so prepared will be covered when necessary as a protection from damp and from extremes of temperatures.

## CHAPTER 6 SIGHT TESTS

### SECTION 76.—INTRODUCTION

#### **Prefatory notes**

283. For adjustments which are to be carried out by qualified REME personnel no detail is given below and the detail given in the User Handbook will be followed.

284. The detail given below covers the Mark 4 range scale plate. It also applies to the Mark 3 range scale plate until this is superseded.

285. Droop is disregarded. The effect, if any, of droop is absorbed in the results of calibration.

#### **Aim**

286. The aim of sight testing is to ensure that the sights are maintained in the correct relation to the gun.

#### **Responsibility for the conduct of tests and adjustments**

287. Sight tests fall into two categories as follows:—

- (a) Tests which are to be carried out daily and after periods of prolonged firing (Tests I, II, V(a), V(c), VI(b), VII and VIII). The GPO is responsible for ordering these tests to be carried out, and the No. 1 for carrying out the tests and ensuring that the appropriate adjustments are made where necessary. The GPO and the section commanders are responsible for supervising the conduct of the tests and adjustments.
- (b) Tests which are to be carried out only occasionally, *eg*, weekly, on the orders of the GPO. (Tests III, IV, V(b) and VI(a).) Adjustments which are found to be necessary as the result of these tests will not be carried out except by qualified REME personnel.

During training, the tests of sub-para (a) above will be carried out frequently in order that all ranks concerned are practised both in the tests and the adjustments.

### Checking

288. After an adjustment has been made as the result of any test, the test will be repeated in order to ensure that the adjustment has been accurately carried out.

### The adjusting pin of the sights holder

289. Throughout sight testing, the adjusting pin will be set and locked at the setting recorded on the shield for sight testing. This setting will be "6" unless it is found that with this setting, there is insufficient throw in the adjusting pin to allow zeroing to be carried out (para 342).

In the above event, any convenient setting other than "6" may be chosen and recorded on the shield.

### Record of sight testing, zeroing and calibration

290. A table should be painted on the shield for recording data relating to sight testing and firing.

An example is given below.

MV's				ANTI-TANK		
Charge	NH 025	W WM NH 012	NQ(R) AN		PIN	COWL
1	621	639	636	TEST ..	6	0
2	974	987		FIRE ..	4	+2
3	1472	1474		KNOWN ANGLE 5°55'		
Super		1726				

The MV's are found as a result of calibration.

The anti-tank data is found by zeroing.

The known angle is found as a result of test IV(b) (para 331).

### Sequence of tests

291. Certain of the tests described below are dependent on the correct adjustment having already been made in certain of the previous tests. The tests will, therefore, always be carried out in the sequence detailed below.

### Preparation for tests

292. Before the tests are begun, the carriage will be placed on a firm platform which is as level as possible. The breech clinometer plane will be inspected to ensure that it is free from grit or paint.

## SECTION 77.—TEST I. TO FIND THE CORRECTION FOR INDEX ERROR OF THE FIELD CLINOMETER

293. The aim of this test is to determine whether the field clinometer accurately records the angle at which the gun is laid.

### Test

294. Set the clinometer at zero degrees zero minutes and place it on the breech clinometer plane. By means of the elevating handwheel, bring the clinometer bubble to the centre of its run. Turn the clinometer end for end and replace it on the clinometer plane. The bubble should again be in the centre of its run.

If the bubble is not in the centre, bring it there by moving the slider (and the arm, if necessary) and note the reading. Half this reading is the correction for index error of the clinometer.

### Check

295. Set the clinometer at the correction so found, place it in the breech clinometer plane and bring the bubble to the centre of its run by means of the elevating handwheel. Turn the clinometer end for end and replace it on the clinometer plane. The bubble should

be in the centre of its run. If it is not, an error has been made in the test of para 294 and the test must be repeated from the beginning.

### **Application of the correction for index error**

296. The field clinometer is used in subsequent tests to lay the gun or sights at given angles. The correction for index error as determined in para 294 must be applied (with its correct sign) to all angles detailed to be set on the instrument, *eg*:—

Reading of clinometer when turned end for end and bubble brought to centre of run .. .. .	+ 2 minutes.
Correction for index error .. .. .	+ 1 minute.
To lay the gun at 20 degrees quad- rant elevation set the clinometer at 20 degrees 1 minute.	

If it is required to set on the clinometer an angle greater than  $45^{\circ}$ , the sign of the correction found must be reversed, *eg*, to lay the gun at  $47^{\circ}$ , set the clinometer to  $46^{\circ} 59'$ .

### **Adjustment of the field clinometer**

297. Whenever practicable, the clinometer should be adjusted by qualified REME personnel as described in the User Handbook, to eliminate index error.

The GPO will ensure that at least one clinometer in the troop is kept so adjusted, and that this clinometer is used for the quick sight test (Sec 90).

## **SECTION 78.—TEST II. TO TEST AND ADJUST THE ZERO SETTING OF THE SIGHT CLINOMETER**

298. The aim of this test is to ensure that the sight clinometer bubble is in the centre of its run when the sight clinometer is set at zero degrees zero minutes and the sight clinometer bracket is horizontal.

**Test**

299. Set the sight clinometer at zero degrees zero minutes, place it in its bracket and bring the bubble to the centre of its run by means of the elevating hand-wheel. Turn the clinometer end for end and replace it in its bracket. The bubble should again be in the centre of its run.

If the bubble is not in the centre, bring it there by turning the micrometer head of the sight clinometer. Note the reading and set the micrometer scale to half this reading.

300. Bring the bubble to the centre of its run by means of the elevating handwheel. Turn the clinometer end for end and replace it in its bracket. The bubble should be in the centre of its run.

301. If the bubble is not in the centre, an error has been made in the operations of para 299. Repeat these operations from the beginning until turning the clinometer end for end as described in para 300 does not disturb the central position of the bubble.

**Adjustment**

302. Slacken the nuts securing the micrometer scales and, holding the micrometer head, slip the scales to zero and reclamp. If necessary slacken the screws securing the reader of the degree scale, move the reader to zero and reclamp. Check the adjustment by repeating the test.

### SECTION 79.—TEST III. TO TEST THE SIGHT CLINOMETER FOR CONSISTENCY

303. The aim of this test is to disclose inconsistency in the sight clinometer.

**Test**

304. Set the sight clinometer at zero degrees zero minutes, place it in its bracket and bring the bubble to the centre of its run by means of the elevating hand-wheel.

305. Turn the micrometer head clockwise for two or three complete turns and then turn it back, anti-clockwise, until the bubble is again in the centre of its run, taking care not to overrun the central position. Note the reading.

306. Repeat the operation of para 305, but turning the micrometer first anti-clockwise and then clockwise.

Any difference between the readings noted in para 305 and 306 is an error due to insensitiveness of the bubble, or backlash in the gears, or both.

Repeat the steps of paras 304, 305 and 306, but with the clinometer set initially to 5 degrees elevation and then to 5 degrees depression, and note the errors in each case.

#### **Adjustment or rejection of the clinometer**

307. If the clinometer cannot be adjusted by qualified REME personnel to reduce all errors to 2 minutes or less, then the clinometer should be exchanged.

### **SECTION 80.—TEST IV. TO TEST THE CROSS-LEVELLING GEAR**

308. The aim of this test is to ensure that, when the dial sight carrier is vertical, the cross level bubble is in the centre of its run and is at right angles to the axis of the bore.

#### **Test**

309. Set the drift scale plate to zero, set zero TE on the range scale plate, set the sight clinometer to zero degrees zero minutes, cross level, and bring the bubble of the sight clinometer to the centre of its run by means of the elevating handwheel.

(For the remainder of the test care must be taken not to disturb the position of the piece, *ie*, do not touch the elevating or traversing handwheels.)

Fix the plane testing carrier in the dial sight socket, set a field clinometer to zero degrees zero minutes, corrected if necessary for index error, and place the field clinometer along the transverse positioning marks. The bubble of the field clinometer should now be in the centre of its run; if it is not, centralize it by means of the cross levelling gear. The cross level bubble will not now be central, and should be adjusted by qualified REME personnel, and the test repeated.

When the cross level bubble has been adjusted as described above, remove the field clinometer.

By means of the range gear handwheel apply maximum range to the sight, noting the effect on the cross level bubble. If the bubble fails to remain in the centre of its run during operation of the range gear, it should be adjusted by qualified REME personnel. On completion of adjustment the whole test should be repeated.

### **Adjustment**

310. Any adjustment required to the cross level bubble should be carried out by qualified REME personnel as described in the User Handbook.

## **SECTION 81.—TEST V (a). TO TEST AND ADJUST THE RANGE SCALE GEAR**

311. The aim of this test is to ensure that the TE scale correctly indicates the elevation applied to the gun.

### **Test**

312. Ensure that the range scale plate and the TE pointer are correctly positioned, as follows:—

- (a) Set the range reader to the extreme right of the reader arm.
- (b) Bring the range scale gear to minimum elevation stops by means of the range scale handwheel.

- (c) If necessary, slacken the securing screw at the apex of the range scale plate and revolve the plate until the zero degree graduation is in line with the dot of the range reader.
- (d) Clamp the securing screw and check the setting.
- (e) If necessary, slacken the securing screws of the TE reader plate and move the plate until the TE pointer is in line with the zero degree graduation on the TE scale.
- (f) Tighten the securing screws and check the setting.
- (g) Set the range reader to the left, away from the TE scale.

313. Test the relationship between the TE as read on the range scale plate and the TE applied to the gun, as follows:—

- (a) Set the sight clinometer at zero degrees zero minutes.
- (b) Set the range scale plate at 20 degrees TE, *ie*, by means of the range scale handwheel, bring the 20 degree mark on the TE scale against the TE pointer.
- (c) Set the field clinometer to 20 degrees, corrected if necessary for index error.
- (d) Place the field clinometer on the breech clinometer plane and bring the bubble to the centre of its run by means of the elevating handwheel.
- (e) Cross-level the sight.

The bubble of the sight clinometer should now be in the centre of its run.

## Adjustment

314. Adjust the range scale gear, if necessary, as follows:—

- (a) Slacken the lock nuts on the parallel motion link adjusting block at the upper end of the sight operating arm.
- (b) Manipulate the adjusting block screws to alter the setting of the adjusting block, until the sight clinometer bubble is in the centre of its run.
- (c) Check to ensure that the range scale plate is still at 20 degrees TE.
- (d) Tighten the lock nuts.
- (e) Check the adjustment by repeating the test as described in para 313.

Only qualified REME personnel may adjust the range scale gear by any other method than that described above.

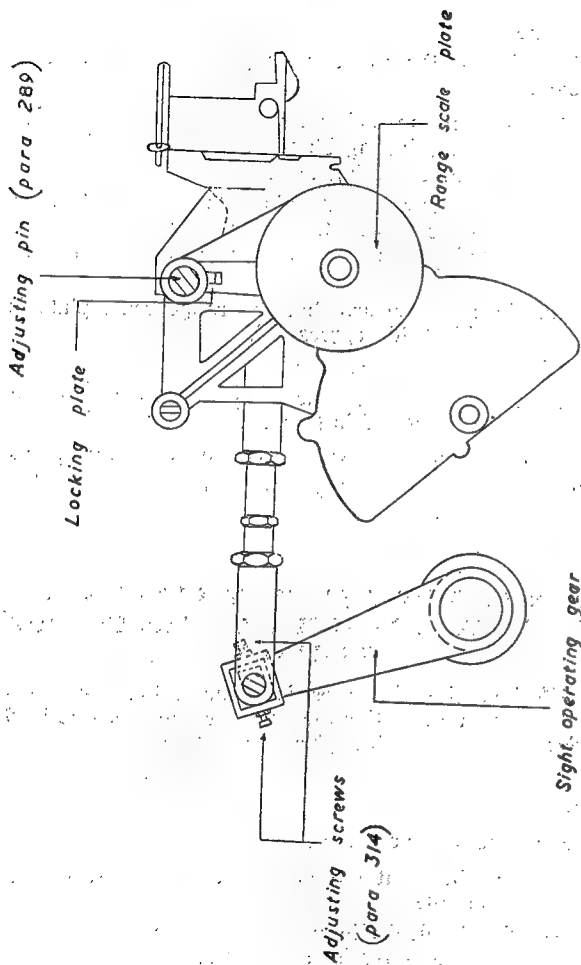
## SECTION 82.—TEST V (b). TO TEST THE RANGE SCALE GEAR FOR ACCURACY THROUGHOUT ITS RANGE

315. The aim of this test is to ensure that the agreement between the TE scale and the gun, as obtained in Sec 81 applies to all angles of elevation.

## Test

316. The test is conducted as follows:—

- (a) Set the sight clinometer at zero degrees zero minutes.
- (b) Set the field clinometer to 10 degrees corrected if necessary for index error.



Sight operating gear  
 FIG 10—The sight operating gear and dial sight carrier

(c) Place the field clinometer on the breech clinometer plane and bring the bubble to the centre of its run by means of the elevating handwheel.

(d) Bring the sight clinometer bubble to the centre of its run by means of the range scale handwheel, cross level the sight and check to ensure that the sight clinometer bubble is central.

(e) Note the reading of the TE scale of the range scale plate.

(f) Repeat the above steps, with the field clinometer set first at 30 degrees and then at 40 degrees.

The reading of the TE scale as noted in (e) above should be 10 degrees and the readings as noted in (f) above should be 30 degrees and 40 degrees respectively.

### **Adjustment**

317. If the errors at 10, 30, and 40 degrees exceed 5, 10 or 15 minutes respectively, the sight must be adjusted by qualified REME personnel as described in the User Handbook.

## **SECTION 83.—TEST V (c). TO TEST AND ADJUST THE MV CORRECTOR SCALE READERS**

318. The aim of this test is to ensure that the MV corrector scale readers are set at the correct MV for the charge and propellant in use.

### **Test and adjustment**

319. Inspect the MV corrector scale readers to ensure that they are set at the MVs of the gun for the corresponding charges and propellants, para 290.

If necessary, unclamp the readers, using the key provided, set them to the correct setting, reclamp, and check the setting.

## SECTION 84.—**PREPARATION FOR ALIGNMENT TESTS**

320. For the alignment tests, a distant laying mark should be used when available (para 321). Otherwise the target testing sights, made locally from the dimensions shown in Fig 11 should be used (para 322).

### **Distant laying mark**

321. When a distant laying mark is to be used, the following preparations will be made before tests VI to VIII are begun:—

- (a) Select the laying mark, *ie*, a well defined object at least 1,500 yards distant.
- (b) Fit cross-wires on the muzzle brake, using the engraved axis lines. These cross-wires are used as a fore sight in laying the bore on the distant object.
- (c) Remove the striker case complete with striker. The firing hole is then used as a hind sight in laying the bore on the distant object.
- (d) Set the range scale plate at zero TE.
- (e) Set the main scale of the dial sight at zero degrees zero minutes.
- (f) Set the micrometer scale of the cowl of the dial sight at zero.

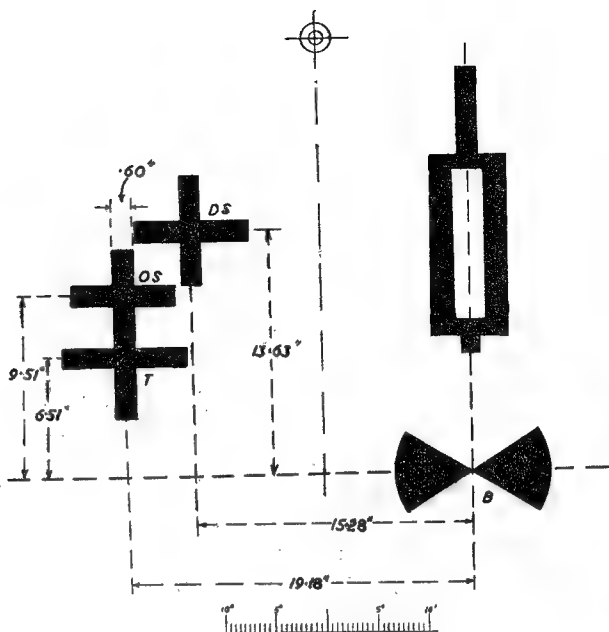


FIG 11—The target testing sights

- (g) Set and lock the adjusting pin of the telescope holder at the setting recorded on the shield for sight testing.
- (h) Set the deflection scale of the open sight at zero.

### Target testing sights

322. When the target testing sights is to be used, the following preparations will be made before tests VI to VIII are begun:—

- (a) Set up the target testing sights about 50 yards in front of the gun and at right angles to the axis of the bore.

- (b) Set the drift scale plate at 1 degree 5 minutes.
- (c) Ensure that the top of the dial sight carrier and the target testing sights are sloped to the same angle as the carriage as follows:—
- (i) Lay the gun horizontal and place the plane testing carrier in the dial sight socket.
  - (ii) Place a field clinometer transversely on the breech clinometer plane and move the slider (and the arm, if necessary) until the bubble is in the centre of its run. Note the reading.
  - (iii) Place the field clinometer transversely on the plane testing carrier, with the arc pointing to the same side of the gun as before, and with the arm and slider still set as in (ii), above. Bring the field clinometer bubble to the centre of its run by means of the cross-levelling gear.
  - (iv) Tilt the target to the angle noted in (ii), above, by means of a plumb bob used in conjunction with the arc painted on the target.
- (d) Without moving the cross levelling gear carry out the preparations detailed in para 321 sub-paras (b) to (h).
- (e) Lay the bore on point B of the target testing sights by means of the elevating and traversing handwheels. Check to see that the vertical cross-wire is aligned on the line and rectangle above B, *ie*, check to ensure that the tilting of the target described in (c), above, has been correctly carried out.

## **SECTION 85.—TEST VI (a). TO TEST AND ADJUST THE DIAL SIGHT SOCKET**

323. The aim of this test is to ensure that all dial sights within the battery are interchangeable, in order that a damaged sight may be replaced without the need for carrying out an alignment test.

### **Test**

324. Select a gun and position the adjusting screw of the dial sight socket to give maximum throw in each direction. Place a dial sight (to be used as the master dial sight) in the dial sight socket. Carry out the alignment test described in para 328 or 329, and, if necessary, the adjustment described in para 330. Using the master dial sight on each gun in turn, carry out the test described in para 328 or 329.

### **Adjustment**

325. If the sight is not in alignment, a qualified REME tradesman should slacken the locking nut of the adjusting screw of the dial sight socket and bring the sight into alignment by manipulating the adjusting screw and the wing nut of the securing screw. He should then securely lock the adjusting screw and check the alignment of the sight.

### **Subsequent sight testing**

326. The adjusting screws, having been set and locked as described above, will not be moved during the normal alignment test (Sec 86).

Immediately at the conclusion of the adjustment described in para 325 all dial sights, including spares, will be tested and adjusted by the normal alignment test (Sec 86).

## SECTION 86.—TEST VI (b). TO TEST AND ADJUST THE DIAL SIGHT FOR LINE

327. The aim of this test is to ensure that the main scale of the dial sight correctly records the horizontal angle between the line in which the gun is laid and the sight line through the dial sight.

### Test

328. When using a distant laying mark, the test is carried out as follows:—

- (a) Complete the preparations detailed in para 321.
- (b) Lay the bore on the distant object by means of the elevating and traversing handwheels.
- (c) Cross-level the sight.

The dial sight should now be laid (for line) on the distant object.

329. When using the target testing sights, the test is carried out as follows:—

- (a) Complete the preparations detailed in para 322.
- (b) Lay the bore on point B of the target by means of the elevating and traversing handwheels.

The dial sight should now be laid (for line) on point DS of the target.

### Adjustment

330. If the tests of para 328 or 329 show that the dial sight is not in alignment, the dial sight is adjusted as follows:—

- (a) With the bore still laid on the distant object or on point B of the target, revolve the micrometer heads of the dial sight until the sight is laid (for line) on the distant object or on point DS of the target.
- (b) Slacken the securing screws of the dial plate reader and the clamping cap or screw of the left micrometer head.

- (c) Shift the dial plate reader and the micrometer drum to zero, and reclamp them in this position.
- (d) Check the alignment of the bore and the sight.

### To find the "known angle"

331. Before the quick sight test for line can be carried out, the "known angle" must be found. Once the dial sight is in alignment the "known angle" is found as follows:—

- (a) Set the drift scale plate to zero.
- (b) Fit a diaphragm to the dial sight.
- (c) Lay the gun at 20 degrees elevation.
- (d) Operate the cross-levelling gear until it is at full throw in the position where the dial sight cowl is farthest from the bore.
- (e) Turn the dial sight by means of the micrometer heads until it is laid on the left edge of the muzzle brake.
- (f) Record the angle read on the main scale of the dial sight (*see para 290*). This is called the "known angle".

The "known angle" should be checked periodically and after a change of dial sight.

## SECTION 87.—TEST VII. TO TEST AND ADJUST THE DIAL SIGHT FOR ELEVATION

332. The aim of this test is to ensure that the sight line through the dial sight is parallel to the axis of the bore when the following conditions are satisfied:—

- (a) The range scale plate is set at zero TE.
- (b) The cowl of the dial sight is set at zero.
- (c) The main scale of the dial sight is set at zero degrees zero minutes.

**Test**

333. At the conclusion of the procedure detailed in para 330 lay the bore on the distant object or on point B of the target.

The dial sight should now be laid for elevation (and for line) on the distant object or on point DS of the target.

**Adjustment**

334. If the dial sight is not laid for elevation on the distant object or on the point DS of the target, revolve the micrometer head of the cowl until the dial sight is so laid.

Slacken the micrometer collar clamping cap (Nos. 7A, B, C dial sights) or micrometer collar clamping screws (No. 9 dial sight) and slip the micrometer collar to zero. Reclamp the micrometer collar, and check that the bore and the sight are still correctly laid.

If the arrow on the view finder of the cowl is not now opposite the zero mark and if there is any danger that the micrometer head could be wrongly set by one complete turn, the arrow may be erased and a fresh arrow scribed opposite the zero mark by qualified REME personnel.

## **SECTION 88.—TEST VIII. TO TEST AND ADJUST THE TELESCOPE AND OPEN SIGHT**

335. The aim of this test is to ensure that the sight lines through the telescope and open sight are parallel to the axis of the bore when the following conditions are satisfied:—

- (a) The adjusting pin of the telescope holder is set at the setting for sight testing (para 290).
- (b) The range scale plate is set at zero TE.
- (c) The deflection scale of the open sight is set at zero.

**Test**

336. When using a distant laying mark, the test is carried out as follows:—

- (a) Complete the preparations detailed in para 321.
- (b) Lay the bore on the distant object.
- (c) Cross-level the sight.

The telescope and open sight should now be laid (for line and elevation) on the distant object.

When using the target testing sights, the test is carried out as follows:—

- (d) Complete the preparations detailed in para 322.
- (e) Lay the bore on point B of the target.

The telescope and the open sight should now be laid (for line and elevation) on points T and OS of the target.

**Adjustment of the telescope**

337. Adjust the No. 41 telescope, if necessary, by slackening the four radial adjusting screws and rotating them as required, thus moving the graticule vertically and horizontally until the telescope is laid (for line and elevation) on the distant object or on point T of the target.

Tighten the four adjusting screws and check the alignment of the bore and the telescope.

**Adjustment of the open sight**

338. Adjust the open sight, if necessary, as follows:—

(a) *For line.*

- (i) Turn the micrometer until, with the detent plunger engaged, the sight is as nearly as possible laid (for line) on the distant object or on point OS of the target.

- (ii) Slacken the clamping screws of the hind sight, accurately align the sight and then tighten the clamping screws.
  - (iii) Slacken the clamping screws of the deflection scale plate, move the plate until the zero is opposite the reader of the hind sight and then tighten the clamping screws.
  - (iv) Check the alignment of the bore and open sight.
- (b) *For elevation.*—Slacken the clamping nut at the bottom of the fore sight and screw the fore sight up or down until the sight is laid on the distant object or on point OS of the target. Tighten the clamping nut and check the alignment of the bore and the open sight.

### **Preparation for firing**

339. At the conclusion of sight testing, the cross-wires at the muzzle will be removed and the striker case will be replaced.

The adjusting pin of the telescope will then be set and locked at the setting recorded on the shield for firing.

### **SECTION 89.—ZEROING**

340. The aim of zeroing is to ensure that (for elevation) the point of impact coincides with the point of aim at the range at which zeroing is carried out.

Zeroing should be carried out after a new barrel has fired 15 EFCs and at the beginning of each subsequent quarter of life.

Zeroing must be carried out with all the anti-tank projectiles and each charge which it is proposed to use for anti-tank shooting either at practice or in war. Live HESH shell will not be used for zeroing; inert filled shell of identical ballistics will be issued for this purpose.

### **Preparation for zeroing**

341. Bring the gun into action on a level platform and carry out sight tests as laid down in para 287(a). At 600 yards from the gun, and as nearly as possible on the same level, set up the zeroing target (a black canvas screen 9 feet square, divided centrally by white bands vertically and horizontally to form a white cross).

### **To zero**

342. The gun is zeroed as follows:—

- (a) Set the adjusting pin of the telescope holder at the sight testing figure, or, if the gun has been previously zeroed, at the last known firing figure for the ammunition and charge ordered.
- (b) Set the range reader to the correct scale for the ammunition and charge ordered, the range scale plate at 600 yards, the drift scale plate to the charge ordered and bring the bubble of the cross levelling gear central.
- (c) Using the traversing and elevating gears, lay the telescope on the white cross of the screen and fire.
- (d) If the round misses the screen, apply a correction for range and/or lead, re-lay and fire again. Continue to correct until a hit is obtained on the screen near its centre (within 3 feet of centre).

- (e) Re-lay and fire two more rounds, re-laying accurately on the white cross for each round. This should result in a three round group on the screen. Re-lay on the white cross after the last round. The mpi of the three round group will be marked so that it can be seen by the layer, both through his telescope and dial sight.
- (f) Without disturbing the alignment of the bore, set the range scale plate at 600 yards, slacken the locking plate of the adjusting pin, and rotate the adjusting pin until the telescope is laid for elevation on the mpi of the three round group.
- (g) Clamp the locking plate.
- (h) Look through the dial sight, revolve the micrometer of the dial sight cowl until the dial sight is laid for elevation on the mpi of the three round group, making the last movement one of depressing the sight line.
- (i) Using the traversing and elevating gears lay the telescope on the white cross and fire a check round. Using the traversing and elevating gears lay the dial sight on the white cross and fire a check round. The check rounds should not be farther away from the horizontal white line than half the vertical spread of the three round group. If the check rounds are correct, record the setting of the adjusting pin of the telescope holder and of the dial sight cowl (*see* para. 290). If the check rounds are incorrect, repeat the zeroing procedure.

The open sight is carried on the telescope holder and is, therefore, automatically zeroed when the telescope is zeroed.

## SECTION 90.—THE QUICK SIGHT TESTS

343. The aim of these tests is to disclose any gross error for line or elevation. If an error is disclosed, greater than the limits of tolerance allowed, the sight tests detailed in para 287 (a) will be carried out in full.

The quick sight tests will be carried out immediately after the occupation of a position or at the first interval in firing. The tests will also be carried out during any pause in prolonged firing.

Response to fire orders must not be delayed because tests are in progress. The tests must be abandoned if fire orders are received.

### The quick range scale test

344. The GPO will order "**Quick sight tests. Angle of sight zero. Tangent elevation 20 degrees**". Each No. 3 will set the sight clinometer at zero, set the range scale plate at 20 degrees TE, lay roughly for elevation, cross-level the sight, and bring the sight clinometer bubble to the centre of its run by means of the elevating handwheel.

345. The GPO, or a deputy, using a field clinometer without index error or with known index error (para 297), will set the field clinometer to 20 degrees and place it on the breach clinometer plane.

The bubble of the field clinometer should be in the centre of its run.

346. If the bubble is not in the centre of its run, it will be brought so, by moving the slider (and the arm, if necessary) of the field clinometer. If the reading differs from the value given in para 345 by less than 10 minutes, the sights will be accepted as correct for elevation. If the reading differs by 10 minutes, or more, the sight tests detailed in para 287 (a) will be carried out.

**The quick alignment test**

347. The GPO or a deputy may check the adjustment of the dial sight quickly as follows:—

- (a) Set the drift scale plate to zero.
- (b) Fit the diaphragm to the dial sight.
- (c) Operate the cross-levelling gear until it is at full throw in the position where the dial sight cowl is farthest from the bore.
- (d) With the gun laid at 20 degrees turn the dial sight by means of the micrometer heads until it is laid on the left edge of the muzzle brake.
- (e) The main scale of the dial sight should now read the "known angle" recorded as laid down in para 331.
- (f) If there is an error of 10 minutes or more in this reading, a full alignment test should be carried out. If, however, it is not possible to do a full alignment test before firing, the main scale should be altered to read the angle recorded in para 290.
- (g) A full alignment test should be carried out at the first opportunity after an alteration as in (f) above.

### **SECTION 91.—SIGHT TESTS FOR USE WITH CRANKED DIAL SIGHT ADAPTERS**

348. The aim of these tests is to ensure that the dial sight is correctly aligned and that the elevation applied to the gun is 30 degrees greater than the algebraic sum of the elevations registered by the tangent elevation scale and the sight clinometer on the cranked adapter.

The cranked adapter should be tested on the gun with which it is to be used.

349. Before these tests are begun, the normal sight tests as laid down in Sections 77 to 88 should be completed.

### **The elevation test**

350. Place the cranked adapter in the dial sight socket, place the sight clinometer in the bracket on the cranked adapter and set it at zero degrees zero minutes.

351. Set the field clinometer at 30 degrees, corrected if necessary for index error, hold it on the normal sight clinometer bracket and by means of the elevating handwheel bring the bubble to the centre of its run.

352. The sight clinometer bubble should now be in the centre of its run. If it is not, bring it to the centre of its run by turning the micrometer head. If the reading is within 10 minutes of zero, the adapter can be accepted as correct. If the reading differs from zero by 10 minutes or more, the sight clinometer bracket of the cranked adapter should be adjusted by qualified REME personnel.

### **The alignment test**

353. Place the dial sight in its normal socket and set the main scale at zero degrees zero minutes. Set the drift scale plate at zero. Set the tangent elevation scale at 30 degrees.

If it is thought that the shield will obscure the distant laying mark when the cranked adapter is fitted, raise the spade sufficiently to permit the laying marks to be seen.

354. Lay on a distant object through the dial sight in the normal manner. For the remainder of the test, care must be taken not to disturb the position of the piece, *ie*, not to touch the elevating or traversing handwheels.

355. Remove the dial sight and insert the cranked adapter. Place the dial sight in the adapter and set the main scale at zero degrees zero minutes. Set the tangent elevation scale at zero degrees zero minutes. Cross-level the sight,

356. The vertical crosswire should be laid on the distant object. If it is not, slacken the locking nut of the adjusting screw on the socket of the cranked adapter and bring the dial sight into alignment by manipulating the adjusting screw and the wing nut of the securing screw. Securely lock the adjusting screw and check the alignment of the sight.

357. Remove the cranked adapter. Replace the dial sight in its normal socket and check that the main scale is at zero degrees zero minutes. Set the tangent elevation scale to 30 degrees. Cross-level the sight and check that the vertical crosswire is still laid on the distant object. If it is not, the whole test must be repeated.

## CHAPTER 7

### SERVICING DRILL

#### SECTION 92.—TO EXAMINE EQUIPMENT

##### Notes

358. In order to ensure that faults are detected and remedied as soon as possible, the following drill should be carried out at least once every 24 hours when in action. During training it should be carried out before the guns leave the gun park.

##### Drill

359. On the command "**Examine equipment**", the detachment carry out their duties as detailed in preparation for action, together with the following additional duties:—

1 tests the buffer and recuperator, assisted by 3, as necessary. He tests the protrusion of the striker after 2 has removed the breech block. With 3, he tests and adjusts sights. He sees that the MV corrector readers of the fuze indicator and gun rule, if provided, are correctly set. He checks the fuze setter hand for serviceability. He satisfies

himself that spare parts are present and interchangeable and that gun stores are complete. He examines the muzzle brake.

2 removes the breech block, cleans and lightly lubricates the breech and firing mechanism, prepares the striker for 1 to test the protrusion, and then assembles the breech mechanism.

3 cleans and lubricates the elevating, traversing, sighting and firing gears and assists 1 in testing sights, buffer and recuperator.

4, 5 and 6 clean the bore, leaving it dry or lightly oiled as ordered by 1.

1 reports any deficiencies to the section commander or GPO.

#### SECTION 93.—**TO TEST THE BUFFER AND RECUPERATOR**

360. The following tests should normally be carried out by 1 with the assistance of qualified REME personnel. When any number of tests are carried out, they must be carried out in the order detailed. The adjustments which are necessary if the tests disclose faults are described in the User Handbook and should not be carried out without the assistance of qualified REME personnel except in cases of emergency when such assistance is not available. Before beginning the tests 1 should ensure that the piston rods, cradle cap and cut-off gear are properly connected up.

At the conclusion of the tests 1 should ensure that the stop running back has been removed and that the piston rods, cradle cap and cut-off gear are properly connected up.

361. *Test I. To test for aeration of liquid in the recuperator.*

(a) 1 fits the stop running back.

(b) 3 lays the gun at approximately 10 degrees elevation.

(c) 1 unscrews plug N of the HP cylinder by not more than one turn, until liquid begins to flow:—

(i) If the liquid is clear, there is no aeration and 1 screws plug N home.

(ii) If the liquid is frothy, aeration is present and 1 allows liquid to flow until a clear flow is obtained. He then screws plug N home.

362. *Test II. To test for liquid in the air reservoir.*

(a) 1 ensures that the stop running back is in position.

(b) 3 lays the gun at approximately 30 degrees elevation.

(c) 1 ensures that valve K is closed, removes plug H and opens valve K by one turn:—

(i) Liquid, if present, will be forced out of the opening H.

(ii) As soon as air only is escaping 1 closes valve K and replaces plug H.

(d) 3 lays the gun horizontal.

(e) 1 removes the stop running back.

363. *Test III. To test whether the recuperator contains the correct quantity of liquid.*

(a) 3 lays the gun horizontal.

(b) 1 ensures that the gun is in the fully run out position.

(c) 1 inspects the tell-tale rod through the slot in the floating piston-rod cover:—

(i) if the end of the rod (excluding plug L) is flush with the rear of the slot, the liquid is correct.

- (ii) If the end of the rod is not in the correct position, the liquid should be adjusted as described in the User Handbook, but in an emergency this action may be deferred provided the rod is not more than 1 inch from its normal position.

**364. Test IV. To test the recuperator air pressure.**

- (a) 3 lays the gun at approximately 10 degrees elevation.
- (b) 1 ensures that the gun remains in the fully run out position.
- (c) 1 removes plug H and inserts the adapter with pressure gauge and blanking cap.
- (d) 1 opens valve K two turns:—
  - (i) The pressure gauge should read 600 lb per square inch.
  - (ii) If the air pressure is not correct, it should be adjusted as described in the User Handbook, but in an emergency this action may be deferred provided the pressure is between 500 and 650 lb per square inch.
- (e) 1 closes valve K, removes the adapter and gauge and replaces plug H.

**365. Test V. To test whether the buffer is correctly filled.**

- (a) 3 lays the gun horizontal.
- (b) 1 removes plug M and notes the level of the oil in the reservoir as indicated on the dipstick attached to plug M. The oil level should be at the marking  $\frac{3}{4}$ , but in an emergency it can be accepted as correct provided it is not below  $\frac{1}{2}$  or above  $\frac{7}{8}$ .

- (c) 1 unscrews the snifting valve and oil should flow from the valve hole. Replace the snifting valve.
- (d) 1 makes up the oil in the reservoir to the correct level, using the cylinder filling funnel.
- (e) 1 replaces plug M.

#### SECTION 94.—TO TEST THE PROTRUSION OF THE STRIKER

366. Full details of stripping and assembly of the breech and firing mechanism are given in the User Handbook. The following drill describes the test for protrusion of the striker without any unnecessary stripping. Although the breech block can be removed from the breech ring without first removing the striker case, this method is not desirable because of the extra weight and the increased danger of damage to the firing mechanism.

367. *To remove the striker case from the breech block.*—2 cocks the firing mechanism and sets the safety catch to "Safe". He pulls back the retaining catch plunger, turns the striker case clockwise through one-sixth of a turn and withdraws it from the breech block.

368. *To remove the breech block from the breech ring.*—With the breech mechanism lever in the fully closed position, 2 removes the split pin securing locking screw of the breech block buffer then screws the locking screw of the breech block buffer clockwise until the screw is below the surface of the breech ring. He then pushes the buffer down and removes it from its recess.

He then supports the breech block with his left hand, grasps the breech mechanism lever with his right, releases the catch and moves the breech mechanism lever steadily to the rear and down until

the breech block is almost clear of the breech ring. He then takes the breech block in both hands, lifts it clear and places it upright on the trail.

369. *To replace the striker case in the breech block.*—2 ensures that the firing mechanism is cocked and the safety catch at "Safe". He inserts the striker case into the breech block with its top inclined one-sixth of a turn to the right from its normal position. He pushes it home, turns it anti-clockwise until it is locked in place and sets the safety catch at "Fire".

370. *To prepare the striker for testing the protrusion.*—2 presses the trigger sear to the right with his left hand and eases the striker forward with his right.

371. *To test the protrusion.*—1 applies the No. 16 gauge to the face of the breech block and passes the gauge up and down across the firing pin. The minimum clearance should foul and the maximum should be clear. If the protrusion is incorrect, 1 orders the firing pin to be changed, as described in the User Handbook.

372. *To reassemble the breech mechanism.*—2 removes the striker case from the breech block. He then ensures that the breech mechanism lever is to the rear past the normal fully open position. He lifts the breech block in both hands, inserts the guides in the guide grooves of the breech ring and lifts the block slightly until the actuating crank is opposite the recess in the block. He then supports the breech block in his left hand, grasps the breech mechanism lever with his right hand and moves the breech mechanism lever upwards and forwards to insert the crank into its recess, pushes forward the extractors and closes the breech.

He then inserts the breech block buffer into its recess and unscrews the locking screw until it is firmly fixed in the lug of buffer and replaces the split pin.

He replaces the striker case in the breech block and tests the assembly by opening and closing the breech and by easing the striker forward while 3 pulls the firing lever.

## SECTION 95.—TO TEST THE FUZE SETTER HAND No. 1, MARK 1

### Test

373. Using the hand fuze setter, set the gauge testing No. 1 hand fuze setter, Mark 1 in turn to fuze 5, fuze 35 and fuze 70. The gauge should read fuze set.

### Adjustment

374. If an error of more than  $\pm 1$  in any setting is apparent on the gauge the fuze setter should be adjusted by qualified REME personnel as described in the User Handbook.

## SECTION 96.—SERVICING OF THE RECOIL SYSTEM

375. During firing 1 should watch the action of the recoil system and immediately report or remedy any faults. He should also occasionally elevate the gun, and operate the sniffling valve to remove air from the buffer cylinder. When firing charge 3 he should occasionally compare the length of recoil registered by the recoil indicator with that indicated on the front cap. If the difference is more than 2 or 3 inches, he should report this fact to the GPO.

376. Table I gives the more common faults in the recoil system together with the probable causes and the appropriate remedies or tests. If the tests confirm the suspected cause, the necessary adjustment will normally be made by qualified REME personnel (Sec 93). Adjustments which cannot be made except in operational urgency without assistance of qualified REME personnel are printed in italics.

TABLE I—FAULTS, CAUSES AND REMEDIES

Fault	Cause	Remedy
(1)	(2)	(3)
Recoil and run-out violent.	Loss of oil from buffer	Test V.
Recoil violent or excessive, with failure to run-out.	Loss of air pressure from recuperator.	Test IV.
Normal recoil but violent run-out.	Retarding valve not returning to its seating.	<i>If fault persists after 2 rounds, strip recuperator and inspect valve and spring.</i>
Short recoil with violent run-out.	Excessive air pressure in recuperator.	Test IV.
Jerky run-out or failure to run-out.	Burrs or grit on slides.	Remove obstruction.
Normal recoil but sluggish run-out.	Tight packings.	<i>If fault persists after a few rounds repack the system.</i>
Normal recoil and normal initial run-out, but:— (a) Last 3 or 4-in violent. (b) Last 3 or 4-in incomplete. (c) Last 2-in incomplete.  (d) Last 10-in violent.	Valve adjusting run-out too far open. Valve adjusting run-out closed. Expansion of oil in buffer due to heating, or a pocket of compressed air in buffer. Throttling bush of control chamber worn.	Close valve by one or more settings. Open valve by one or more settings. Elevate gun and operate snifting valve.  <i>Replace bush.</i>
Short recoil with normal run-out. Carriage unstable.	Cut-off gear incorrectly set. (Firing a low charge will give a short recoil but the carriage will be stable.)	<i>Re-set cut-off gear.</i>
Excessive recoil with normal run-out.	Cut-off gear incorrectly set. Worn buffer valves or cylinder.	<i>Re-set cut-off gear.</i> <i>Replace valves.</i>

## SECTION 97.—SERVICING WHEN THE GUN IS RESTED IN ACTION

377. Guns will be rested periodically during periods of prolonged firing, and Nos. 1 will ensure that as much as possible of the following servicing is carried out during such rest periods:—

- (a) *Cooling the bore.* When water is available, an empty cartridge case should be loaded, the gun elevated and water poured in from the muzzle. Otherwise the breech should be left open.
- (b) *Testing and adjusting sights.*—If time is insufficient for the complete test, the quick sight tests should be carried out.
- (c) *Cleaning and lubrication.*—The gun slides, the breech and firing mechanisms are cleaned and lubricated. Inspect the cradle and recoil mechanism.
- (d) *Testing the buffer.*—The snifting valve should be operated and the oil level tested and replenished if necessary as detailed in para. 365.
- (e) *Cleaning the bore and muzzle brake.*—The bore and muzzle brake should be inspected and cleaned if heavily fouled.

## SECTION 98.—GENERAL SERVICING

378. The aim of this section is to provide adequate information for 1 to supervise the servicing of the equipment.

379. 1 is responsible to his section commander that the tasks enumerated below are completed at the intervals stated.

380. The servicing schedule is listed under intervals at which it should be performed. Task marked thus † will be carried out by, or under the supervision of, REME personnel. For tasks marked thus \* REME assistance will be required if adjustments are found to be necessary. Lubricants specified are those which should be used under normal conditions. Reference should be made to the User Handbook for the lubricants to be used under abnormal conditions.

**TABLE II—SERVICING SCHEDULE**

Interval (1)	Task Number (2)	Task (3)	Refer- ence (4)
<b>DAILY</b>	1	Clean and lubricate the bore and muzzle brake, using OC 35, the piasaba cleaner, wool cleaner and rags.  Use kerosine vapourising oil when the bore is very dirty.	
	2	Clean the breech mechanism and firing gear, using OM 52 and lubricate with OC 35 and OC 600. Operate the mechanism after lubrication.  Stores required :— Lubricating injector and can, pliers and screwdriver.	
	*3	Test, clean and lubricate the elevating and traversing gears. Use OC 35 on bright metal surfaces, OC 600 and lubricator injector for enclosed gears and LG 280 on the elevating arc and pinion. Report defects.	

Interval (1)	Task Number (2)	Task (3)	Refer ence (4)
DAILY	*4	<p>Clean and lubricate the cradle and recoil mechanism, using OC 35 for bright parts and 10 : 1 mixture of OC 600 and OX 320 for the cradle guides. Inspect cylinder block and cradle guides for burrs and damage. Inspect glands for leakage. When firing, test air pressure and check oil levels.</p> <p>Stores required :—Spanners 781 and 782.</p> <p>Two adjustable spanners. Nos. 11, 12 and 14 keys, No. 246 artillery tool, No. 2 valve connector.</p> <p>No. 16 pressure gauge, air charging pipe, compressed air cylinder, running back stop, filling funnel, pliers, screwdriver.</p> <p>Adapter No. 1 Mk. 2</p>	Sec 93
	5	<p>Clean and lightly oil the sights with OC 35, and wipe dry afterwards. Lubricate sight operating gear with OC 600. Test the sights and report any defects.</p> <p>Stores required :—</p> <p>Dial sight adjusting wrench.</p> <p>No. 244 spanner.</p> <p>Field clinometer.</p> <p>Plane testing carrier.</p> <p>Pliers and screwdriver.</p> <p>Muzzle cross-wires.</p>	Secs 76-91
	6	<p>Clean all ammunition. Inspect projectiles for damage to driving bands and cartridge cases for distortion, etc. Report any defects.</p>	
WEEKLY	*7	<p>Test air pressure and liquid levels in buffer and recuperator. Inspect glands for leakage.</p> <p>Using the No. 7 pulling back apparatus, pull back the gun if it has not fired. Inspect slides and guides for burrs.</p> <p>Stores required :—</p> <p>As for task No. 4, plus No. 7 pulling back apparatus.</p>	Sec 93
	8	<p>Check tightness of wheel nuts. Test tyre pressure and inflate to 35-lb per square inch (Run flat—20-lb).</p> <p>Inspect tyres for cuts and damage.</p>	

Interval (1)	Task Number (2)	Task (3)	Refer- ence (4)
<b>WEEKLY</b>	*9	Jack-up wheels, clean and lubricate the brake operating gear, using OC 35 and OC 600, test and, if necessary, adjust brake operating gear. Ascertain that wheels revolve freely and have no excessive play or wear.	
	10	Clean and lubricate the cradle clamp and working parts of trail, using OC 35 and OC 600 or LG 280 as applicable. Report any looseness in rivets or fitted parts.	
	*11	Clean and lubricate the saddle and trunnion cap squares, using OC 35 and OC 600. Elevate and depress gun and report any defects.	
	12	Clean all painted surfaces with hot water and carriage water brushes.	
	13	Treat all leather work with dubbin.	
	14	Check and inspect all spare parts, tools and stores. Report damage and deficiencies.	
<b>MONTHLY</b>	15	Clean enclosed teeth of gears with kerosine vapourising oil, wipe dry and lubricate with OC 600. Work gears through whole range after lubrication.	
	16	Test all spare parts for interchangeability.	
<b>THREE-MONTHLY</b>	†17	Remove, clean and replace the loose barrel, muzzle brake and breech ring. Stores required :— Nos. 85 and 86 Artillery tools, adjustable spanner, No. 22 C spanner, pliers, screwdriver, skidding, rope sling, handspike.	
<b>EXAMINATION BEFORE LEAVING THE GUN PARK</b>	*18	Examine equipment. Lubricate trail eye with LG 280, check wheel nuts and tyre pressures, inflate to 35-lb per square inch (Run flat—20-lb). Check split pins and other locking devices.	Sec 92

Interval (1)	Task Number (2)	Task (3)	Refer- ence (4)
DURING HALTS	19	Inspect, and when necessary, tighten wheel nuts, check air pressure in tyres. Check that all stores are secured in position and have not come loose by vibration. Check the setting of the platform housing bracket adjusting nuts.	
	20	Remove accumulated dust and grit from whole equipment.	
AFTER TRAVELLING	*21	Clean and lubricate whole equipment. Clean all paint work. Inspect guide-ways in cradle and slides on cylinder block. Remove all foreign matter from tyres and fill small cuts with stopping, reporting any large cuts or damage. Inflate if necessary. Inspect generally. Tighten all nuts and report any damage, looseness, excessive play or deficiencies.	
BEFORE FIRING	22	Clean, wipe dry and inspect the bore, and muzzle brake.	
	*23	Inspect glands of recoil system for excessive leakage.	
DURING FIRING	24	Service recoil system.	Sec 96
WHEN GUN IS RESTED IN ACTION	25 to 29	Servicing of gun.	Sec 97
AFTER FIRING	30	Wash out the bore and muzzle brake with boiling water. The muzzle brake should be removed if possible. Dry clean and lubricate with OC 35. The threads of the muzzle brake and the end of the barrel should be coated with XG 280 before the muzzle brake is replaced.	
	*31	Clean and lubricate whole equipment. Tighten all nuts and report any damage, looseness, excessive play or deficiencies.	

## CHAPTER 8

## MAN-HANDLING AND WINCHING

## SECTION 99.—INTRODUCTION

381. Over difficult country, chains, winch, planks and improvised aids should be used to assist in moving the gun and vehicles. It may be necessary to man-handle gun, trailer and tractor separately over particularly difficult stretches.

382. Detailed instructions for driving and winching are given in "Mechanical Vehicle Training, Volume I, Part IV (WO Code No 8675). The notes in Sec 101 are intended only as a guide to Nos. 1.

383. Guns will often have to be manhandled into position or to alternative positions. As far as possible, each detachment should therefore be capable of moving the gun and trailer without outside assistance. Over rough ground, the gun and trailer should be moved separately and the correct methods of lifting and pulling must be applied. Manhandling is not a drill, and men should be detailed to tasks in accordance with their physique.

384. Efficient manhandling depends on concerted effort by the whole detachment, directed by 1. 1 must take charge, ordering "Take the strain", "Together—Heave", "Hold", etc, as required and there must be no other talking. Constant practice is required.

## SECTION 100.—MAN-HANDLING

**Lifts and pulls**

385. In lifting heavy objects the best position is with the feet parallel and approximately 12 inches apart, the knees bent and the back as straight as possible. Full use is then made of the strong muscles of the buttocks and legs, thus conserving energy and reducing the chance of injury.

386. *The collier's lift.*—The back is turned towards the object to be lifted, which is then grasped with arms straight, knees bent and back as straight as possible. The lift is then performed by straightening the legs, using the muscles described above. This lift can be applied from the muzzle side of the shield when the gun is to be taken trail first over an obstacle.

387. *The rope pull.*—This is a pull as in a tug-of-war. The rope is held under the right armpit, and grasped with both hands close together, the left hand in front, palm upward and left arm straight. The feet should be at right angles to the rope, one on each side of the rope, both pointing to the right and about 12 inches apart from front to rear. The left leg should be straight to provide leverage and the right leg bent to provide driving power.

If men are placed on the right of the rope, their positions are as described above but with left and right interchanged.

In order to avoid waste of effort when two or more men are to pull on a rope, the rope must be straight, *ie*, the men must be aligned in the direction of the pull, and if the rope is attached low down, the men must be sized with the shortest in front.

On the level, the pull is divided into two phases, "taking the strain" and "heaving". On a slope there is a third phase "holding".

(a) On the order "**Take the strain**"—Each man allows the body to fall back to an angle of about 45 degrees, keeping the body straight from the sole of the leading foot to the crown of the head. The sides of the feet should be dug well into the ground and the rope made taut.

(b) On the order "**Heave**"—Keeping the strain on the rope, each man lowers the angle of the body and heaves by a powerful stretch

of the legs and body. As soon as possible, both feet are moved in the direction of the pull.

(c) On the order "**Hold**"—Each man holds the rope taut as described in (a) above, until 1 orders "**Rest**", *eg*, when the brakes have been put on or chocks placed under the wheels.

(d) *Towing on the flat*.—When the gun is on fairly level ground and can be kept on the move, the dragropes can be used for towing. The ropes are attached to the drag washers, each man faces the direction of the tow, and pulls on the rope with one or both hands beside the body, the leading man on each rope passing the rope round his body.

### Aids to man-handling

388. In order to avoid waste of effort, full use should be made of the aids given in paras 389 to 395.

389. *The spade*.—When going uphill it is generally best to man-handle the gun muzzle first. The spade can then be used to prevent the gun running back when "**Hold**" is ordered. The traversing handspike should be fitted for use when necessary for raising the spade or for forcing it into the ground.

390. *Brakes*.—These should be applied at once on the order "**Hold**" and released on "**Take the strain**".

391. *Chocks*.—These are stones, wooden blocks, etc, used for the following purposes:—

- (a) Placed close against a wheel, to prevent it running down hill.
- (b) Placed against a vertical obstacle, to form a small ramp or step.

392. *Ramps or planks*.—These may be used for crossing a ditch or for making a sloping path over a vertical obstacle.

393. *The platform.*—This may be used for crossing a narrow ditch (up to 2 feet 6 inches). The gun is brought up to the ditch trail first and the trail put across. Two handspikes are positioned across the ditch to form supports for the platform, when lowered, to prevent buckling. The platform is lowered on to the two handspikes and positioned so as to rest equally on both banks of the ditch. The gun is run on to the platform, the platform stays are locked, and the gun traversed round through 180 degrees so that it can then be run off, muzzle first on to the other side of the ditch. The trail stays are then released from the trail and the gun run clear. The trailer can then be run across the platform.

Apart from such uses, the platform is best removed from the gun for crossing obstacles.

394. *Dragropes.*—These may be used for a direct pull attached to the drag washers, or a double leverage may be obtained by the use of a wheel purchase.

In attaching dragropes to the drag washers, the back of the hook should be downward, for ease of attaching and because the hook cannot then catch in obstacles such as undergrowth or wire.

In making a wheel purchase, the rings at the ends of the dragrope chains are attached to the hooks on either side of the wheel, as low down as possible on the side away from the direction of the required pull. The dragrope is then laid along the circumference of the tyre and the pull must be in line with the wheel. In moving the gun uphill or across heavy ground by wheel purchase, it is often best to move one wheel at a time.

395. *Handspikes.*—When the gun is manhandled muzzle first, one handspike should be used in the centre socket, for guiding the trail and for lifting the spade over obstacles.

When the gun is man-handled trail first, normally across fairly even ground, two handspikes should be

fitted, one in each of the side sockets, and two men should lift each handspike. The handspikes are then held in the bend of the arm and the effort applied by pushing on the handspike with the chest.

The handspikes can also be used for strengthening the platform when crossing a ditch, or as skids under the spade (para 393 and 396 (a)).

### **To run the gun on to the platform**

396. On soft ground there is generally no difficulty in putting the gun on to its platform. The following methods may be used if the ground is hard and the tractor is not available.

- (a) *Using the trailer as a hoist.*—With the gun hooked in to the trailer, 2, 3, 4 and 5 lower the platform to the ground and push it close to the gun wheels. 1 goes to the trailer parking brake, and details the two tallest men to the trailer lifting handles and the remainder to the shield.

The trailer perch having been raised as far as possible, and the gun wheels pushed against the platform, 1 applies the trailer brake.

The men on the shield take post for the collier's lift, the central man putting his back under the cradle.

1 then orders "**Together—Heave**". On the command "**Together**" the men on the perch push it up. On the command "**Heave**", they pull it sharply down, while the men on the shield lift, and the gun is run on to the platform.

- (b) *Using handspikes as skids.*—In a confined space, the following method may be used.

The platform is lowered and positioned as required. The wheels are pushed close against the platform, and two handspikes

are then placed as skids under the spade box, parallel to the sides of the trail.

1 then details three men for the collier's lift on the shield and one for each wheel.

1 orders "**Together—Heave**". On the command "**Together**" the gun is moved one or two inches away from the platform, and on the command "**Heave**" it is run on.

### SECTION 101.—WINCHING

397. An attempt to tow the gun and trailer across bad ground after wheel spin has begun is almost certain to result in bogging the tractor. In moderate ground it may be practicable to tow the trailer across to firm ground and then return for the gun. In really bad ground the trailer and gun should be unhooked at once and the tractor driven forward to the extent of the winch cable. The tractor is then halted, the brakes applied, and the winch cable pulled out and attached to the perch eye, by means of a shackle. The trailer and gun are then winched to the tractor, or in very bad ground first one and then the other is winched across.

398. The following considerations are important:—

- (a) The tractor should be pointing as closely as possible along the line of the pull, so that the pull is direct.
- (b) The shackle must be used for attaching the cable to the perch eye or trail eye, *ie*, the cable itself must not be bent sharply round the perch eye or trail eye.
- (c) The cable must be under tension during paying out and winding in.
- (d) The cable must be kept clean and must not be allowed to drag on the ground.
- (e) The cable must not be completely unwound from the winch drum. There should be three or four turns of the cable round the drum before winching begins.

## APPENDIX I

## BREAKING DOWN DRILL

## Notes

1. The following drill is designed for the quick breaking down of equipments for transport when space is limited, *eg*, in small boats. The drill is based on the men and tools available within the section of two guns.

2. With practice, the detachments should be able to strip the equipment in 25 minutes and re-assemble it in 30 minutes, without the assistance of qualified REME personnel. The composition of the stripped loads is shown in para 19 of this Appendix.

3. The number of men required per equipment is seven, *ie*, the normal detachment plus the driver, except that when lifting the piece, ten men are required.

4. The tools required are as follows:—

Handspikes, 6-ft (or improvised equivalent)	4
Pliers or pincers .. .. .	1
Screwdrivers, 4-in .. .. .	1
Screwdrivers, 8-in .. .. .	1
Hammer, lead .. .. .	1
Spanner, adjustable, 11-in .. .. .	1
Spanner, adjustable, 15-in .. .. .	1
Hammer, claw .. .. .	1
Drift, No. 18 .. .. .	1
Spanners ( <i>see</i> para 5 of this appendix)	
Skidding, 4-ft × 1-ft × 3-in .. .. .	1
Selvagees, or rope slings .. .. .	3

The selvagees or slings are desirable but not essential. If they are not available, rag or sacking should be wrapped round the handspikes to prevent slipping of the loads.

5. Spanners of the required sizes are part of the contents of "Fitters filled MT tool chests" which are held by all batteries. The following sizes are required:—

5/16-in, 7/16-in,  $\frac{1}{2}$ -in,  $\frac{3}{8}$ -in, 11/16-in.

6. Great care must be taken in handling the equipment, or serious damage may be done. Covers should be placed on the ground to receive small items and to prevent the equipment picking up dirt.

7. Nuts, bolts and split pins must be replaced in the appropriate parts of the equipment as soon as these have been dismantled in order to avoid loss or difficulty in re-assembling due to uncertainty about the correct position.

8. Before removing the piece, skidding must be placed across the trail to provide a support when required while the detachment rest or change position. The piece must be laid horizontal and the cradle clamp must be housed against the left side of the trail. The brakes must be applied.

9. In order to avoid mixing the parts of several equipments which are to be stored together, all components of each equipment should be marked with the sub-section letter and number.

10. Throughout the drill, even numbers work on the right side of the gun and odd numbers on the left, except where otherwise detailed.

## Drill

11. *To remove the firing platform.*—4 and 5 depress the catch levers and free the trail stay connecting eyes from the trail pintles.

2, 3, 4 and 5 remove the platform complete with stays.

12. *To remove the shield.*—2, 3, 4 and 5 unbolt the shield stays from the trail and remove the shield complete with stays.\*

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\* If difficulty is experienced in removing the shield complete with stays it may be necessary to unbolt the shield from the left stay.

13. *To remove the sights.*—1 disconnects the parallel motion link from the sight operating arm, by removing the connecting hinge bolt.

6 disconnects the sight supporting bracket from the saddle bracket.

1 and 6 remove the sights complete with the parallel motion link.

14. *To remove the piece.*—The muzzle brake and counterweight will be removed first.

2 and 3 remove the muzzle brake.

4 and 5 remove the counterweight.

1 lays the piece horizontal and lashes the elevating handwheel. He removes the gun securing strap.

6 removes the cotter pins from the cylinder block rear projection.

2 and 3 insert a handspike in the muzzle and 6 inserts a handspike in the breech.

4 and 5 place a handspike transversely under the breech ring immediately in front of the breech block.

1 orders "Lift", and the piece is lifted clear of the cylinder block and moved about one foot to the rear.

4 and 5 move their handspike as far forward as possible.

7, 8, 9 and 10 place a handspike under the breech ring.

1 orders "Lift", and the piece is moved approximately two feet farther to the rear.

2 and 3 remove their handspike from the muzzle and place it transversely beneath the piece as far forward as possible.

The piece is carried to the rear, clear of the carriage, under the direction of 1, who controls the movement of the piece and assists to steady it as necessary.

15. *To remove the cradle and cylinder block.*—1 disconnects the cut-off gear from the saddle. 2 and 3 remove the cap squares from the trunnions.

2, and 3, 4 and 5, 6 and 7 man handspikes under the cradle, or pass slings, if available, under the cradle and man handspikes passed through the slings.

1 orders "Lift" and the cradle is lifted clear of the trunnion bearings and moved to the rear under the direction of 1, care being taken not to damage the elevating arc.

2 and 3 replace the trunnion cap squares and bolt them in place.

16. *To remove the saddle.*—4 and 5 remove the nut from the foot of the saddle pivot. They insert a handspike in the trunnion bearings. 2 removes the traversing stop on the right guide clip if fitted. 1 and 6 remove the traversing gear connecting pin, traverse the saddle to disengage the guide clips from the trail guides and assist 4 and 5 to lift the saddle clear of the trail.

17. *To remove the trail assembly.*—2 and 3 remove the nuts securing the trail to the crossbar brackets.

2, 3, 4 and 5 stand at the front of the trail in rear of the crossbar, 1 orders "Lift" and they lift and support the trail while 1 operates the brake and, assisted by 6, pushes the crossbar, and wheels assembly clear of the trail.

18. *Re-assembly.*—The equipment is assembled in the reverse order. All nuts must be tightened up and split pins inserted. Qualified REME personnel should examine the equipment before the gun is fired.

19. <i>Composition of the stripped loads:</i>	Approximate weights
Piece, with breech mechanism .. .. .	9 cwt.
Cradle and cylinder block .. .. .	8 cwt.
Trail .. .. .	7 cwt.
Saddle .. .. .	2 cwt.
Axle and wheels .. .. .	8 cwt.
Shield .. .. .	2 cwt.
Platform, firing .. .. .	2 cwt.
Sights and parallel motion link .. .. .	$\frac{1}{2}$ cwt.
Muzzle brake .. .. .	$\frac{1}{2}$ cwt.
Counterweight .. .. .	1 cwt.

## APPENDIX II

## CONSTRUCTION OF GUN PITS

**Basic dimensions of gun pit**

1. Fig 12 shows the dimensions of a pit which allows a switch of 60 degrees on each side of the centre line.

**Method of construction**

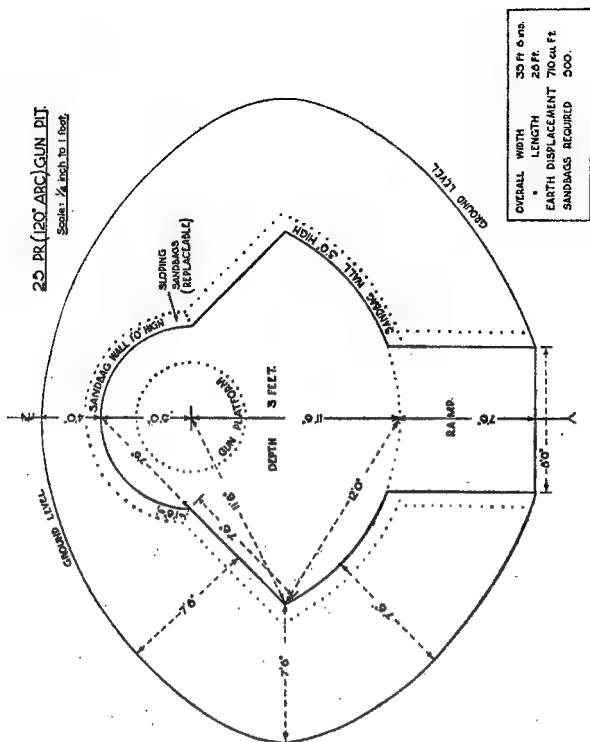
2. The following sequence should normally be adopted for gun pit construction; however the procedure may have to be varied and certain items omitted, depending on the nature of the ground and time available.

3. *Marking*.—Mark out the pit and perimeter on the ground. For night digging the pit should be marked out with white tape.

4. *Deturfing*.—Remove turfs, etc, from the area inside the perimeter, leaving a strip of turf around the edge of the pit approx two feet wide. This strip acts as a guide during excavation and in the construction of the sandbag wall. Stack the turfs, grass to grass and earth to earth, outside the perimeter. Remove top soil and pile it against the turfs.

5. *Preparations for revetment*.—Insert short pickets approx four feet outside the perimeter, and attach eight strands of revetment wire to each picket. Lay the wire on the ground and allow a one foot overlap at the pit wall. One short picket and wires are required for each two feet of revetment. This distance may be increased to three feet if firm revetment material (eg, corrugated iron sheeting, planks, etc), is to be used.

6. *Digging and sandbagging*.—Digging and sandbagging should proceed concurrently. During digging keep all soil within the perimeter. Lay the first, third, fifth, etc, courses of sandbags as headers, with the



**FIG 12—Low angle gun pit**

neck away from the centre of the pit. Lay the second, fourth, sixth, etc, courses of sandbags as stretchers (*ie*, lengthways along the wall), with the side seam away from the centre of the pit.

Sandbags should be filled three-quarters full, the corners should be tucked in when laid and the sandbag beaten flat with a shovel or pick helve. Care must be taken to break the bond when laying stretchers. On completion of digging and sandbagging spread the soil evenly against the sandbags as shown in Fig 12.

7. *Turfing*.—Spread the top soil over the banks and the tops of the sandbag walls, and cover with turfs.

8. *Revetment*.—Before starting revetment check the measurements of the pit.

(a) *Preliminary revetment*.—Complete any revetment which cannot be done once the pit is occupied.

(b) *Final revetment*.—Provided that the ground is not unduly soft, final revetment may be carried out after occupation of the pit.

(c) *Windlassing*.—Attach the revetment wires to the retaining pickets. Windlass the wires at the perimeter, by inserting a stick or six inch nail between the wires and twisting. Drive the short pickets below ground and bury the revetment wires.

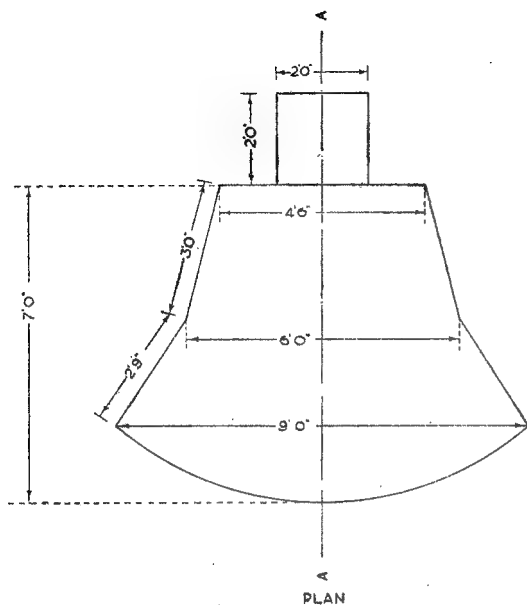
9. *Drainage*.—Drainage must be considered during the recce and construction of a gun pit, and should be completed as early as possible.

### Shelters

10. Shelters for ammunition and for the detachment should be dug close to the gun pit and connected to the pit by slit trenches.

### High angle gun pits

11. An example of a high angle gun pit is shown at Fig 13. It provides an arc of fire of 15 degrees on either side of the centre line.



Arc of fire ..... 30 degrees

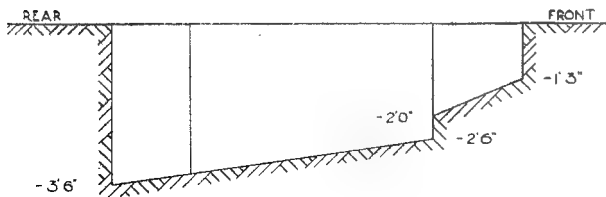


FIG 13—High angle gun pit

**APPENDIX III****GUNNERS' TEST—FIELD BRANCH  
ARTILLERY**

1. In this appendix are contained the tests for gun detachment commanders, and detachment numbers including layers. They are based on the qualifications required for gunners 1st class and 2nd class as specified in Regulations for Army Trades and Employments, 1952, Sec 3 Part 2A.

2. In each detachment the aim should be to have at least two members qualified in the duties of 1, at least one gunner 1st class, and the remainder gunners 2nd class. A list of personnel qualified as Nos. 1, gunners 1st and 2nd class and layers should be kept. All NCOs and gun numbers should be tested periodically and a careful record of their performance in these tests maintained so that their progress may be assessed.

3. It is recommended that records of the tests passed should be entered in the soldier's appropriate documents so that when he changes unit the new unit may have a guide as to his capabilities.

4. Nos. 1 tests should be carried out under a regimental testing board. The remainder may be carried out under regimental or battery testing boards.

**SECTION 1.—GUN DETACHMENT  
COMMANDER'S TESTS**

5. In this section are contained the tests for potential gun detachment commanders or classification of 5 star soldiers as laid down in Regulations for Army Trade and Employments 1952, Sec 3, Part 2A.

6. All candidates will be tested practically and orally in six groups of tests. Group A covers the duties of 1 connected with laying. Group B covers anti-tank duties. Group C covers examination of equipment. Group D covers fire discipline. Group E covers gun drill instruction. Group F covers various miscellaneous items.

7. All candidates must have qualified as Gun number RA First Class before being eligible to take the Gun Detachment Commander's Tests.

### Time limits

8. Time limits where applicable are specified in the details of the tests.

### Marking

9. Where groups consist of several tests the minimum pass mark for any one test will be 50 per cent. Candidates must attain a minimum of 80 per cent in each group. A candidate can be allowed to resit one test to attain the necessary standard.

10. The maximum marks and deductions are stated in the details for each test or group of tests.

### Group A—Laying

11. *Timings.*—The times allowed for each test are as follows:—

Test	1	2	3	4	5(a)	5(b)
Time limit	1' 15"	1' 15"	45'	1' 00"	10"	5"

The No. 1 will call out "Ready" as soon as he has finished the test.

The time will be taken from the conclusion of the orders for the test, until the report "Ready" from the No. 1.

12. *Marking.*—A maximum of 10 marks will be allowed for each test. Where there are several parts the marks will be equally allotted.

### 13. Deductions.

(a) One mark will be deducted:—

- (i) for each five seconds or fraction of five seconds taken beyond the time limit;
- (ii) for each mistake in the manipulation of the sighting gear or in the drill.

(b) No marks will be given for a test :—

- (i) if the dial sight, sight clinometer or range scale is incorrectly set ;
- (ii) if the wrong angle is reported to the examiner ;
- (iii) if the trail when moved is more than one degree out from the correct switch.

### Orders

14. The orders for the lay must be given out by the examiner clearly and distinctly, a realistic pause being made after each separate order.

All orders will be acknowledged by 1 and acted upon at once.

### Preparation

15. The officer in charge of the tests should be assisted by an examiner with a stopwatch at each gun, and a recorder with a record sheet (AF B 5111) on which all orders will be noted for reference when the lay is checked.

16. Before the test starts the aiming point will be indicated to all concerned.

### Orders

### Procedure

17. Test 1. Record centre of arc.

“ Aiming point ”.

“ .. degrees .. minutes ”.

“ Record as bearing.... degrees.”

The candidate will perform the duties of 1 and a classified layer will perform the duties of 3.

The procedure will be as laid down under “ To lay the gun in the centre of arc—Aiming point method ”. The troop aiming point will not be used as GAP 1 or 2.

**Orders****Procedure****18. Test 2. GAP obscured.**

“More (or less) .. degrees .. minutes”.

“Angle of sight .. degrees minutes elevation (or depression)”.

“(Elevation) .. ”.

“GAP 1 obscured” (from 3)

The candidate will perform the duties of 1 and the procedure will be as laid down under “To Lay” and “To change from one GAP to another”. The switch ordered will be less than 2 degrees.

**19. Test 3. Check centre of arc.**

“Check centre of arc.”

“Aiming point director”.

“Number .. ”.

The gun to remain as laid in Test 2. The candidate will perform the duties of 1 up to and including reporting angle to GPO. Procedure will be as laid down under “To check centre of arc.” GPO to order “Number .. Correct”. Gun to be relaid at bearing, angle of sight and range recorded.

**20. Test 4. Parallel lines to a named gun.**

“Bearing .. degrees .. minutes”.

“Angle of Sight .. ”.

“(Elevation) .. ”.

When gun laid.

“Parallel lines to number .. ”.

Candidates to perform duties of 1 of named gun. Assistant examiner to perform the duties of 3 and to incorporate an error in the sight. Procedure will be as laid down under “Parallel lines to a named gun”.

**Orders****Procedure****21. Test 5. Movement of trail.**

(a) "Bearing . . degrees".

Candidate to perform the duties of 1.

(b) "More (or less) . . . . degrees".

(a) Switch to be more than 10 degrees.

(b) Switch to be less than 2 degrees.

Procedure will be as laid down under "To direct the movement of the trail".

**Group B—Anti-tank**

22. To conduct Test 1 several groups of model tanks should be laid out on a landscape model. The rough range, direction and speed of movement of the groups should be given to the candidate. Tests 2 and 3 may be done on a blackboard or with a blobstick on the landscape model.

**23. Marking and deductions.**

(a) Maximum marks will be allotted as under :—

- |              |    |    |    |    |           |
|--------------|----|----|----|----|-----------|
| (i) Test 1   | .. | .. | .. | .. | 10 marks. |
| (ii) Test 2  | .. | .. | .. | .. | 5 marks.  |
| (iii) Test 3 | .. | .. | .. | .. | 5 marks.  |
| (iv) Test 4  | .. | .. | .. | .. | 10 marks. |

(b) Deductions will be made as under :—

- |                    |    |    |   |
|--------------------|----|----|---|
| (i) Test 1         | .. | .. | Two marks for each mistake.                             |
| (ii) Tests 2 and 3 | .. | .. | All marks for an incorrect alteration of lead or range. |
| (iii) Test 4       | .. | .. | Two marks for each incorrect answer.                    |

24. *Test 1.*—The candidate, having been shown a particular tank, will order a complete sequence of initial orders to engage that tank.

25. *Test 2.*—The candidate, having been given the indication of fall of shot, will order a correction to lead.

26. *Test 3.*—The candidate, having been given the indication of fall of shot, will order a correction to range.

27. *Test 4.*—The candidate will answer five questions on the action to be taken at the gun at the “**Normal**” state and on receipt of the orders “**Prepare for tanks**” and “**Tank alert**”.

### Group C—To examine equipment

28. The candidate will carry out the tests in this group practically. He will be aided by various members of the detachment as stated in the tests. No marks will be deducted for mistakes by these personnel, nor will there be any time limits.

#### 29. *Markings and deductions.*

(a) The maximum marks will be allotted as under :—

- |              |       |          |
|--------------|-------|----------|
| (i) Test 1   | .. .. | 30 marks |
| (ii) Test 2  | .. .. | 10 marks |
| (iii) Test 3 | .. .. | 10 marks |

(b) Deductions will be made as under :—

- (i) Test 1 Five marks for each mistake in sequence.

Five marks for failure to fit or remove the stop running back.

Two marks for a mistake in drill.

- (ii) Tests 2 and 3. All marks for drawing the wrong conclusion.

30. *Test 1.* In conjunction with 3 the candidate will carry out the tests for the buffer and recuperator as laid down under “To test the buffer and recuperator”.

31. *Test 2.*—In conjunction with 2 the candidate will test the protrusion of the striker as laid down under “To test the protrusion of the striker”.

32. *Test 3.*—The candidate will carry out the quick sight-tests as laid down under “The quick sight tests”. (Sec 90).

**Group D—Fire discipline**

33. The candidate will be asked six questions on fire discipline for No. 1. The answers will be given orally. Five marks will be allotted for each correct answer.

**Group E—Gun drill instruction**

34. The candidate will instruct a detachment in any two of the following drills :—

- (a) To come into action (Sec 16).
- (b) To lay the gun in the centre of arc (Sec 19).
- (c) To record centre of arc (Sec 20).
- (d) To load (Sec 28).
- (e) To cease firing and limber up (Sec 45).

25 marks will be allotted for each and the candidate will be judged on his ability to instruct.

**Group F—Miscellaneous**

35. The candidate will answer one question orally on five of the following subjects :—

- (a) Gun pits.
- (b) Winching.
- (c) Disablement of the gun.
- (d) Drill with damaged equipment.
- (e) Drill with reduced detachment.
- (f) Manhandling.
- (g) Preparation for sight testing.

36. Five marks will be allotted for each correct answer.

**SECTION 2.—GUNNERS RA TESTS**

37. Each candidate will be tested practically and orally in six groups of tests with his own equipment. Group A covers laying. Group B covers the performance of duties of any member of the gun detachment in action, less No. 1. Group C covers the servicing of equipment. Group D covers the misfire drill. Group E covers ammunition and fuzes, including setting of the fuzes and reading the fuze indicator. Group F covers the tannoy.

**Time limits**

38. Time limits where applicable are specified in the details of the tests.

**Marking**

39. Where groups consist of several tests the minimum pass mark for any one test will be 50 per cent. To become a Gunner 1st class the candidate must pass in all tests, must attain a standard of 1st class layer in Group A and attain a minimum of 80 per cent in Groups B to F. To become a Gunner 2nd class he must pass in all tests, must attain a standard of 2nd class layer in Group A and attain a minimum of 60 per cent in Groups B to F. A candidate for 1st class can be allowed to re-sit one test to attain the necessary standard. For 2nd class the candidate may be allowed to re-sit two tests to attain the necessary standard.

40. The maximum marks and deductions are stated in the details for each test. At no time will the deductions of marks exceed the maximum allowed for the test.

**Group A—Laying**

41. The laying test will be as laid down in Section 3 of this appendix.

**Group B—Duties in action**

42. *Test 1.*—Loading drill. The candidates will be tested in the duties of the numbers concerned in the drill "To load". Maximum marks will be 10. Deductions of two marks will be made for each mistake in drill.

43. *Test 2.*—Gun rule. The candidate will set two ranges and read the elevations. Each one will be with a different charge. Maximum marks will be 10. Five marks will be deducted for an incorrect answer.

44. *Test 3.*—Field clinometer. The candidate will set two elevations, having been given the index error. Maximum marks will be 10. Five marks will be deducted for an incorrect setting.

45. *Test 4.*—Planting aiming post. The candidate will be ordered “Aiming posts .. degrees”. He will run out and plant aiming posts and adjust and align them as directed by 3. Maximum marks will be 10. The tolerance will be 5 degrees in planting. Deductions will be made of two marks for each 5 degrees or part of 5 degrees outside the tolerance, and two marks for each mistake in drill.

46. *Test 5.*—Setting up paralleloscope. The candidate will be ordered “Paralleloscopes”. He will set up the paralleloscope where ordered by 1 and orient it under the orders of 3. The drill will be as laid down in “To set up the paralleloscope”. Maximum marks to be allotted will be 10. A deduction of three marks will be made for each mistake in drill.

47. Test 1 is compulsory and any three tests from 2 to 5 will be done.

#### **Group C—Servicing of equipment**

48. *Test 1.*—The candidate to be tested will strip, service and assemble the breech and firing mechanism of his own equipment. Maximum marks will be 10. Deductions of one mark will be made for each mistake in stripping and assembling.

49. *Test 2.*—He will answer three questions on the operation and safety arrangements of the breech and firing mechanism. Maximum marks will be 10. Deductions of three marks will be made for each question incorrectly answered.

50. *Test 3.*—He will answer three questions on the faults, causes and remedies of the recoil system as stated in Table I of the gun drill. Maximum marks will be 10. A deduction of three marks will be made for each question incorrectly answered.

51. *Test 4.*—He will answer five questions on the lubrication and lubrication colour code of his equipment. Maximum marks will be 10. A deduction of two marks will be made for each question answered incorrectly.

### **Group D—Misfire drill**

52. The candidate will answer three questions on the misfire drill. The procedure will be as laid down under "Misfires". Maximum marks will be 15. A deduction of five marks will be made for each question incorrectly answered.

### **Group E—Ammunition and fuzes**

53. *Test 1.*—He will set three fuzes 221 with the fuze key. Each setting will be different. The time allowed will be 10 seconds for each setting. The maximum marks will be 5 for each fuze setting. A deduction of one mark will be made for each two seconds over time and no marks will be allotted if the fuze is incorrectly set.

54. *Test 2.*—He will set three settings on a fuze 213 with the fuze setter hand. Each setting will be different. The first setting will be large enough to necessitate the use of the quick release, the next order will necessitate a small alteration of fuze. The candidate will then set the fuze to "Safe". The time allowed will be 10 seconds, 5 seconds, and 10 seconds. The maximum marks will be 5 for each fuze setting. A deduction of one mark will be made for each two seconds over the time limit, and no marks will be allotted if the fuze is incorrectly set.

55. *Test 3.*—He will identify three types of shell. 10 marks will be allotted with three marks to be deducted for each wrong identification.

56. *Test 4.*—He will identify three different fuzes. Marks and deductions to be as in para. 55.

57. *Test 5.*—He will identify and sort ten cartridges into natures and lots. The ten cartridges are to be selected so that there are at least two natures of propellant and a total of not less than four lots. 10 marks will be allotted and one mark will be deducted for each mistake.

### **Group F—Tannoy**

58. The candidate will connect up the tannoy. 5 marks will be allotted and one mark deducted for each mistake.

### SECTION 3.—GROUP A—LAYING TESTS

59. Layers will be tested by means of four tests. Test A will consist of eight lays indirect, test B of two lays direct, test C of two lays at night, and test D of three lays on stationary miniature anti-tank targets. Where a miniature anti-tank range is available, layers should also be tested for consistency by means of test E. This test will consist of two series, one fired at a stationary and one at a moving target.

#### Timings

60. The times allowed for each lay are as follows :—

Test A								Test B		Test C	
Lay 1	Lay 2	Lay 3	Lay 4	Lay 5	Lay 6	Lay 7	Lay 8	Lay 9	Lay 10	Lay 11	Lay 12
0' 30"	0' 30"	1' 00"	1' 00"	2' 00"	0' 30"	1' 30"	0' 30"	0' 25"	0' 15"	1' 05"	1' 00"

For each lead ordered in lays 13 to 15 the time allowed is 15 seconds.

The layer or No. 1 will call out “Ready” as soon as the gun has been laid, or centre of arc recorded. The time will be taken from the conclusion of the orders for the lay, until the report “Ready” from the layer or No. 1.

#### Marking

61. A maximum of 20 marks will be given for each lay in tests A, B, C and D. Layers will be classified into one of two classes. In order to qualify, a layer must obtain the following marks from the possible total of 300 for tests A, B, C and D :—

1st class layer	..	280 marks.
2nd class layer	..	260 marks.

A first class layer is allowed no re-sits to attain the necessary standard.

A second class layer is allowed to fail in one lay only but he must be retested in that lay and carry it out correctly on the same day to attain the necessary standard.

**62. One mark will be deducted :—**

- (a) for every five seconds or fraction of five seconds taken beyond the time laid down for the particular lay ;
- (b) for each mistake in the manipulation of the sighting gear or in the drill of the layer.

**63. Ten marks will be deducted :—**

- (a) if the correct sequence of laying is not used ;
- (b) if the procedure for recording centre of arc is incorrectly carried out, or the angle incorrectly recorded.

**64. No marks will be given for the lay :—**

- (a) if the dial sight, sight clinometer or range scale is incorrectly set ;
- (b) at indirect laying, if the gun is not correctly laid for elevation and line ;
- (c) at direct laying, if the gun is not laid for elevation or for line within 5 minutes ;
- (d) if the bubble of the cross-level is not wholly visible ;
- (e) in planting aiming posts, if the aiming posts are not planted in line.

**65. In lay 4 the time keeper at each gun must keep a record of the time taken to set each switch, and at the end must report the total. In lay 5 marks up to a maximum of five may be deducted for errors in the positioning of the crossheads.**

**66. When more than one of the detachment are concerned in the test, no marks will be deducted for a fault not attributable to the layer being tested.**

## Orders

67. The orders for the lay must be given out by the examiner clearly and distinctly, a realistic pause being made after each separate order, thus :—

“ Charge 3 ” . pause .. “ Bearing 200 degrees ” ..  
 pause .. “ Angle of sight 1 degree 20 minutes  
 elevation ” .. pause .. “ 6200 ”.

All orders will be acknowledged by 1 and acted upon at once. Should the layer be in doubt at any time about an order, he will refer to 1, who may repeat any part of the order to him. 1 may in turn refer to the examiner.

## Preparation

68. The officer in charge of the tests should be assisted by an examiner with a stop watch at each gun, and a recorder with a record sheet (AF B 5111A) on which all orders will be noted for reference when the lay is checked.

In order to check the accuracy of lay 5, the examiner at each gun will note the centre of arc record to the GAP in use before the lay is begun. At the conclusion of the lay, the correct main scale reading is equal to the angle noted, decreased (or increased) by the difference between the bearing of centre of arc and the bearing ordered.

69. Before Test A is begun, the director will be indicated to all concerned.

70. Before Test B is begun, at least five targets will be selected in the foreground at varying ranges and angles of sight and covering a front of about 30 degrees.

A prominent reference point, approximately in the centre of the target zone, will be pointed out to the Nos. 1 and to the layers. Targets will be indicated with reference to this point by means of the vertical clock code.

71. Before Test D is begun, at least five model tank silhouettes will be set up in the foreground at approximately 10 yards distance from the gun, and approximately

on a level with the sight. When placed at 10 yards the sizes of silhouette for a tank 20 feet long by 10 feet high at various ranges are given below :—

<i>Range</i>			<i>Size</i>
800	..	..	3-in $\times$ 1½-in
600	..	..	4-in $\times$ 2-in
400	..	..	6-in $\times$ 3-in
200	..	..	12-in $\times$ 6-in

72. Before any test is begun the gun should be placed on a firm level platform.

73. During laying tests the layer who is being tested will carry out the normal duties of 3. The duties of 1 will be carried out by a NCO who has qualified in those duties.

#### Test A (Indirect laying)

##### Orders

##### Procedure

#### 74. Lay 1.

“ Aiming point—Director ”  
 “ degrees .. minutes ”  
 “ Record as bearing ..  
 degrees ”.

The procedure will be as laid down under “ To lay the gun in the centre of arc ” and “ To record centre of arc ”. Time to be taken up to the report “ **Finished with the director** ”. A common angle to be ordered to all guns.

#### 75. Lay 2.

“ Charge .. ”  
 “ Bearing .. degrees ..  
 minutes ”  
 “ Angle of sight .. degrees  
 .. minutes elevation (or  
 depression) ”  
 “ (Elevation) .. ”

The bearing ordered will be approximately 10 degrees from centre of arc, and the procedure will be as laid down under “ To lay ”.

## 76. Lay 3.

- “Bearing .. degrees .. minutes ”
- “Clinometer laying ”
- “Angle of sight .. degrees .. minutes elevation (or depression )”
- “Elevation .. degrees .. minutes ”

The bearing will be approximately 10 degrees from previous switch and the QE will be approximately 20 degrees, and the procedure will be as laid down under “To lay”. The timing will start from when the clinometer is placed on the clinometer plane.

## 77. Lay 4.

- “More (or less) .. degrees .. minutes ”
- “More (or less) .. degrees .. minutes ”
- “More (or less) .. degrees .. minutes ”
- “More (or less) .. degrees .. minutes ”
- “More (or less) .. degrees .. minutes ”
- “More (or less) .. degrees .. minutes ”

The aim is to test the layer in application of cumulative switches to the dial sight. He will not be required to lay the gun.

The first switch will be between 5 and 6 degrees. A series of five further line corrections should be ordered with not more than two smaller than 1 degree. The dial sight should be checked after the last switch.

## 78. Lay 5.

- “Bearing .. degrees .. minutes ”
- “Angle of sight zero ”
- “Record as bearing .. degrees—Aiming posts .. degrees ”

The bearing ordered will be less than 2 degrees, and the procedure will be as laid down under “To record fresh centre of arc” and “To plant aiming posts”.

## 79. Lay 6.

“ **Bearing .. degrees .. minutes** ”  
 “ (Elevation) .. ”

The lay will be carried out using the aiming posts. The bearing ordered will be approximately 20 degrees from centre of arc, and the procedure will be as laid down under “To lay”. GPO will order “**Aiming posts**” before the test begins.

## 80. Lay 7.

“ **Paralleloscopes .. degrees** ”

The procedure will be as laid down under “To set up the paralleloscope”. The paralleloscope will be secured to its stand before the test begins.

## 81. Lay 8.

“ **More (or less) .. degrees .. minutes** ”  
 “ (Elevation) .. ”

The lay will be carried out using the paralleloscope. The switch ordered will be approximately 2 degrees and the procedure will be as laid down under “To lay”. GPO will order “**Paralleloscopes**” before the test begins.

**TEST B (Direct laying)**

## 82. Lay 9.

“ **Charge ..** ”  
 “ **Direct laying, dial sight** ”  
 “ **Reference point .. right (or left) .. o'clock .. degrees** ”  
 “ (Description of target) .. ”  
 “ (Elevation) .. ”

The procedure will be as laid down under “To lay”. The examiner will note the exact point of lay. The same point must be used in lay 10.

83. Lay 10.

“More (or less) .. degrees  
minutes ”  
“ (Elevation) .. ”

The switch ordered will be less than 2 degrees and the procedure will be as laid down under “To lay”.

### TEST C (Night laying)

84. Lay 11.

“Charge .. ”  
“Bearing .. degrees ..  
minutes ”  
“Angle of sight .. degrees  
.. minutes elevation (or  
depression) ”  
“ (Elevation) .. ”.

The bearing ordered will be approximately 10 degrees from centre of arc and the procedure will be as laid down under “To lay”.

85. Lay 12.

“More (or less) .. degrees  
.. minutes ”  
“ (Elevation) .. ”

The switch ordered will be less than 2 degrees and the procedure will be as laid down under “To lay”.

### Test D (Anti-tank laying)

86. The examiner orders the sight to be used and then performs the duties of 1, ordering the appropriate range as represented by the silhouette at which he points the gun.

87. Lay 13.

“Telescope ”  
“Target ”  
“ (Elevation) .. ”  
“Zero ” “Traverse ”  
“On ”

The procedure will be as laid down under “Anti-tank laying”.

“Right .. ”

The examiner will check the lay and then order a fresh lead.

The examiner will check the lay and then order a fresh lead.

“Left .. ”

The examiner will check the lay.

## 88. Lay 14.

“Open sight ”  
 “Target ”  
 “(Elevation) . . ”  
 “Zero ” “Traverse ”  
 “On ”

The procedure will be as laid down under “Anti-tank laying”.

The point of lay will be checked after each lead as in lay 13.

“Right . . ”

“Left . . ”

## 89. Lay 15.

“Dial sight ”  
 “Target ”  
 “(Elevation) . . ”  
 “Zero ” “Traverse ”  
 “On ”

The procedure will be as laid down under “Anti-tank laying”.

The point of lay will be checked after each lead as in lay 13.

“Right . . ”

“Left . . ”

**Test E (Miniature anti-tank range)**

90. In order to qualify in this test a layer must pass Series 1 and Series 2 on three out of four consecutive laying parades.

For each series a “test circle” will be decided under unit arrangements, based on the results of the three best layers in the unit.

The qualifying standard in each case is that the five shots must fall inside the appropriate “test circle”.

91. *Series 1.*—This consists of five shots at a stationary target. The examiner gives out an initial sequence of orders and the layer fires one round. The layer traverses and elevates the gun off while the rifle is being reloaded, then lays back on the target and fires again. This process is repeated for five shots.

92. *Series 2.*—This consists of ten shots at a moving target. The target is initially at rest at one end of its run. The examiner, who performs the duties of 1 and 6, gives out an initial sequence of orders incorporating a lead. As soon as 3 has repeated the lead ordered, the target is made to start moving. The run lasts for a standard time, decided by the unit. As soon as the target has moved one foot, the examiner orders “**Fire**” and no further orders are given until the run is finished. The layer fires five shots.

The same process is repeated with the target moving the other way.

## APPENDIX IV

## DISABLEMENT

1. The extent of disablement ordered will depend on the time available and the probability of recapture.

In disabling equipments, all detachments and all troops should follow the same procedure in order that all guns captured will be deficient of the same essential parts. Spares of any part removed must also be taken away.

The dial sight, sighting telescope and clinometers should always be taken away when the gun is abandoned.

2. *To disable a gun so that it can be brought into action soon after recapture.*—Remove the breech mechanism, or if time does not permit this, remove the firing mechanism.

3. *To disable a gun so that it can be brought into action after repair.*—Remove the breech mechanism. Place the gun horizontal. Remove plug H, open valve K and allow the air to escape. Remove plug M and both plugs N. Remove the nuts of the buffer and recuperator piston rods. Elevate until the gun and cylinder block slide to the rear.

4. *To destroy the gun.*—Place a HE shell in the muzzle. Load with HE. Fire the gun from under cover by means of a length of rope or telephone wire attached to the firing lever.

## APPENDIX V

# TO COME INTO ACTION FOR HIGH ANGLE FIRE WITH THE CARRIAGE 25-PR MARK 3

**To bring the gun into the high angle firing position.**

1. On the order "**Prepare for high angle**", the firing platform and spade box are removed and the gun is manhandled into the required position.

1 then orders "**Prepare to lower**". 1 and 6 go to the guard bars of the rubbing plates, 2 and 3 go to the trail in front of the trail hinge bolts, even numbers on the right and odd numbers on the left, and take the weight of the trail, 4 and 5 remove the trail hinge bolts and report "**Clear**".

1 orders "**Lower**". 2 and 3 bear down on the trail until it is in the high angle position, 1 and 6 supporting the rear end of the trail and allowing the spade to skid. 4 and 5 insert the trail hinge bolts and report "**In**".

1 orders "**Take post**". The detachment take up their positions in action. 3 fits the cranked dial sight adapter.

**To return the gun to the low angle firing position.**

2. On the order "**Prepare for low angle**", 1 orders "**Prepare to lift**". The detachment take up their positions as for "**Prepare to lower**". 1, 2, 3 and 6 take the weight of the trail. 4 and 5 remove the trail hinge bolts and report "**Clear**".

1 orders "**Lift**". 1, 2, 3 and 6 lift on the trail until it is in the low angle position. 4 and 5 replace the trail hinge bolts and report "**In**".

3 removes the cranked dial sight adapter.

The gun is then manhandled into the required position, the spade box replaced and the gun run on to the firing platform.

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**RESTRICTED**

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**WO  
CODE No.**

**9065-1**

26/GS Trg Publications/2251

**GUN DRILL**

**FOR**

**QF 25-PR GUN, 2/1, 3/1 AND 4**

**ON**

**CARRIAGE 25-PR, MARKS 1 AND 3**

**1956**

**AMENDMENTS (No. 1)**

**MANUSCRIPT AMENDMENTS**

Page	Para	Line(s)	Delete	Substitute or Add
vi	APP- END- IXES			<i>Below line 6— “VI. Disposal of surplus charges .....180”</i>
10	45	1 3	“(or pulling)”	<i>After “rear”— “, 2 and 3 stand beside the shield”</i>
		7	“, 2 and 3”	

Page	Para	Line(s)	Delete	Substitute or Add
10	45	8	"turn"	"turns" After "about".— "2 and 3 move round the shield."
22	75	3	Full stop	Comma
23		12	"records"	"record"
27		Last	"a"	"at"
28		4	"Paralleloscopes 135 degrees"	"Paralleloscopes ... degrees"
29	Sec 25	Heading	"DIRECT"	"DIRECTOR"
	85	9	"relaying"	"re-laying"
	86	11	"relays"	"re-lays"
	87	1	Full stop	Comma
		2	"No. ... degrees"	"No. .... degrees"
31		10		After "check".— "1 reports this slipping scale read- ing to the GPO".
34	98	11 Last	Complete line "and will await further orders."	" ; he will not fire his gun without a fresh order " Fire" from the GPO". At end of line—" "
45	120	12		
	121	9	"specified"	"specifies"
50		Penulti- mate Last	"and awaits further orders".	Full stop after "ready" "He will not resume firing with- out a fresh order " Fire " from the GPO."
58	155(d)	3-5	From "Unservice- able" to end of para	
59	156	1		After "156."— "Unserviceable ammunition will be reported to the GPO."

Page	Para	Line(s)	Delete	Substitute or Add
73		2 4		Before "or"—("" After "Centre." —" "Zero right (or left) edge" is also cancelled by a fresh sequence of initial orders." At end of line— "For AP shot charge super, the HESH scale is used and 3 reports "HESH charge super set" "fuze indicator"
	198	Last		
94	250	2	"plate"	
97	254(a)	5-6	"or colour markings"	
100	258	3	"observer"	"observed"
112	309	3	", cross level,"	
121	Head- ing	2	"SOCKET"	"SOCKETS"
135	364		Sub-paras (a) and (b) complete	
141	Task 1	2	"OC35"	"OM58"
	" 2	3		
	" 3	2		
142	Task 4	2		
	" 5	2		
143	Task 9	2	"OC600"	"LG320"
	" 10	3		
	" 11	2		
144	Task 30	4		
141	Task 2	3		
	" 3	3	"OC600"	"LG320"
142	Task 5	4		
143	Task 9	3		
	" 10	3		
	" 11	3		
	" 15	3		

Page	Para	Line(s)	Delete	Substitute or Add
142	Task 4	3 to 4	"10 : 1 mixture of OC600 and OX 320"	"LG320"
	" *7	1	"*7"	"*14A" and transfer entire task to position immediately before Task 15, under heading "MONTHLY"
143	Task17	1		After "clean"— "with OM58"
159	Appx III	Heading	"TEST"	"TESTS"
160	11	4	"45"	"45"
161	13(b) (iii)	2	"switch"	"line"
165		Penultimate	"and reading the fuze indicator"	
166	43	1	"Gun rule"	"Fuze indicator"
		2	"elevations"	"fuze lengths"
	44	2		Before "index"— "correction for"
168		Last two	From "one" to "mistake"	"all will be forfeited if incorrectly connected"
169	60	Table	"Test B" and detail	
		1 after table	"to 15"	"and 14"
	61	2 and 5	"B,"	
		4	"300"	"240"
		6	"280"	"220"
		7	"260"	"205"
171	70		Complete para (7 lines)	
173	76	4	"switch"	"bearing"
	78	3	"less than 2 degrees"	"within 2 degrees of centre of arc"

Page	Para	Line(s)	Delete	Substitute or Add
174			From "TEST B"	
175	83		to end of page	
176	89		Complete para	
			Complete para	

### CUT OUT AMENDMENTS

Page 11. *Delete* para 46 and *substitute*:—

Amdt 1/Mar/1958

46. On the order "Mount", the detachment double to the gun towing and section vehicle (if any) and mount. The exact detail depends on the type of vehicle(s).

Page 34, para 97. *Delete* line 5 and *substitute*:—

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normally keep six rounds prepared for loading. If, however, the GPO orders "Prepare ... rounds per gun" they will keep the named number of rounds prepared until fire for effect is ordered \*; thereafter they will prepare rounds as necessary.

Page 34. *Insert* at foot of page:—

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\*Orders such as "One round gun fire" to the ranging gun, in order to find the correct fuze length, are not "fire for effect" for the purposes of this paragraph.

Page 45. *Insert* footnote:—

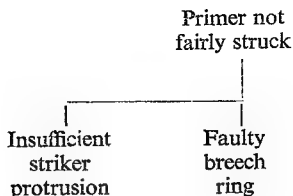
Amdt 1/Mar/1958

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\*The upper edge of the cradle may not be parallel to the piece. This can be detected by comparison of a field clinometer reading on breech plane and cradle. If there is a considerable difference, this should be allowed for when judging crest clearance. The difference can be expected to remain unchanged during the life of the equipment.



Page 48. *Delete* "Primer not fairly struck" and *substitute*:—  
Amdt 1/Mar/1958



Page 49. *Delete* para 128 (a) and *substitute*:—  
Amdt 1/Mar/1958

(a) *Primer not fairly struck*.—This failure is due either to insufficient protrusion of the striker or to a faulty breech ring. 1 tests the protrusion of the striker (*see* Sec 94) and if it is insufficient he fits the spare firing mechanism. If protrusion is correct, the breech ring and breech block must be examined by REME before any further attempt is made to fire the gun.

Page 52. *Delete* lines 1 to 6 and *substitute*:—  
Amdt 1/Mar/1958

(b) *If the primer has not been fairly struck*.—1 returns the cartridge to 5 and tests the protrusion of the striker. If it is insufficient he immediately changes the firing mechanism and orders "Cartridge only—load". If protrusion is correct he reports to the GPO "No. ... out of action".

If his gun is fit to fire, 1 then reports his gun "Ready" to the GPO, or orders "Fire", as appropriate.

Page 57. Para 150, line 5. *After* "cartridge" *add*:—  
Amdt 1/Mar/1958

If ordered by the GPO, 1 will destroy surplus Charge 2 and 3 bags (*see* Appx VI).



Page 58. Para 154. *At end of line 6 add:—*

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If the GPO does not order surplus Charge 2 and 3 bags to be destroyed (*see* Appx VI), they will be packed with the other ammunition.

Page 113. *Delete lines 5 to 9 and substitute:—*

Amdt 1/Mar/1958

Bring the bubble of the field clinometer central by means of the cross-level gear. The cross-level bubble should now be central. If it is not, it should be adjusted by qualified REME personnel and the test should be repeated.

Page 123, para 331. *Delete last two lines and substitute:—*

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The "known angle" should be checked periodically; it must also be checked after a change of dial sight and whenever the dial sight socket is adjusted as a result of Test VI (a).

Page 157. *Delete para 10 and substitute:—*

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10. Shelters for ammunition, that cannot be accommodated in the racks of the gun pit, and for any additional personnel should be dug close to the gun pit and connected to the pit by slit trenches.

Page 163. Para 21. *Delete last three lines and substitute:—*

Amdt 1/Mar/1958

Procedure will be as laid down under "To lay (normal indirect laying)", but layer will not direct movement of the trail.



## NEW PAGES

*Delete* page 156 and *substitute* new page 156 attached.

*Insert* new pages 158A to 158E attached.

*Insert* new pages 180 and 181 attached.

*Prepared under the direction of*  
*The Chief of the Imperial General Staff*

THE WAR OFFICE,  
March, 1958



Amdt 1/Mar/1958

### Use of explosives

12. The time taken to construct gun pits will be materially shortened by using explosives. A suitable form is Plastic Explosive (PE). Consideration must be given to the question whether the use of explosives will disclose the gun position to the enemy.

13. *Digging the charge holes.*—Mark out the pit and remove the turves for future use.

14. Dig charge holes 9 ins in diameter and 6 ins less than the required pit depth. The holes should generally be 5 ft centre to centre and should not be nearer than 2 ft 6 ins to the intended pit walls. Charge holes are most easily dug using an earth auger; if this is not available, a screw picket is useful.

15. Fig 14 shows the layout of charge holes.

In very hard ground a few more charges may be necessary. If so, the 2 ft 6 in clearance from the walls must be maintained.

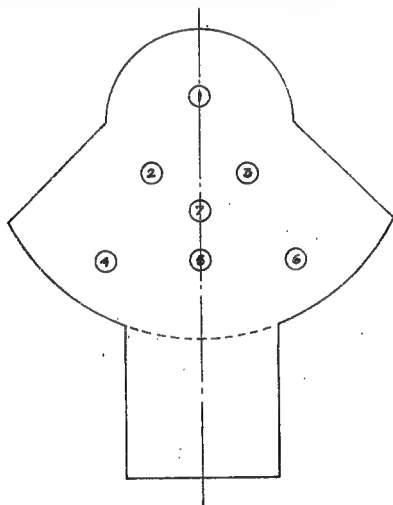
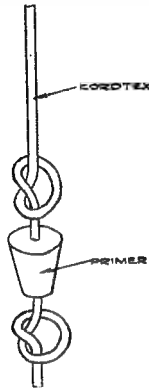


Fig 14.—Placing of 1-lb PE charges for 120 degree gun pit

16. *Making up the charges.*—Each charge will consist of:—  
 A length of detonating cord (cordtex)  
 One 1-oz gun cotton primer  
 Four 4-oz sticks of PE 808 or PE 3.

**Caution**—If PE 808 is used, care must be taken NOT to let the explosive touch the bare skin, otherwise severe headaches may result. Gloves should be worn and the explosive should NOT be removed from its greaseproof wrapping paper.

17. Cut off the first 12 ins of cordtex and discard it. Then cut the cordtex for each charge approximately 3 ft longer than the depth of charge hole. Thread the 1 oz primer onto the length of cordtex and knot it, as shown in Fig 15.



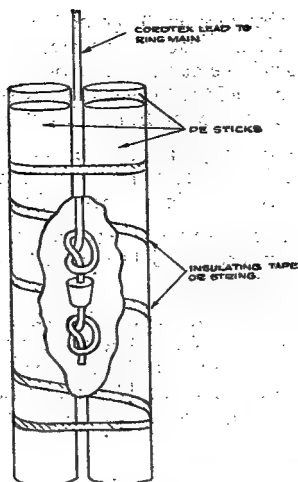
**Fig 15.**—Knotting the primer to the cordtex

18. Lash the four sticks of PE round the primer as shown in Fig 16, using string or insulating tape.

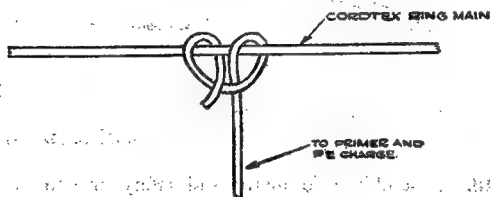
19. *Connecting up the charges.*—Lower the prepared charges into each charge hole and firmly tamp in with earth until the charge holes are full. Care must be taken that the free ends of cordtex are not buried in charge holes.

20. Connect the ends of the lengths of cordtex, protruding from the charge holes, to a length of cordtex known as a "ring main".

The connections are made by means of a clove hitch, as in Fig 17.



**Fig 16.—Lashing the PE round the primer**



**Fig 17.—Connecting cordtex leads to ring main**

21. When all charges have been connected to the ring main, bring the two ends of the ring main together ready to receive the detonator and safety fuze.

22. *Testing the safety fuze.*—Before safety fuze is used it must be tested. Cut off the first 12 ins of fuze and discard it. Then cut off another 12-in length, making the cut on a slant so that an oval of the core is exposed.

23. Lay the safety fuze on the ground and light it. If using safety matches hold the head of the match against the exposed oval of core and rub the match box across it. If using a fuze, light the fuze and hold it to the core. A spurt of ordinary firework sparks should come from the safety fuze.

24. Time the burning of the fuze. One foot should take between 24 and 36 secs to burn. If it takes less or more, reject the whole coil, obtain another and test it as above.

25. Never hold the reputed safety fuze in the hand. Very serious injury may occur should it happen to be detonating cord.

26. *Assembling detonator and safety fuze.*—One detonator No. 27 Mk 1 is required for each gun pit. Lash the detonator between the ends of the ring main as in Fig 18. Note that the open end of the detonator should point in the same direction as the ends of the ring main.

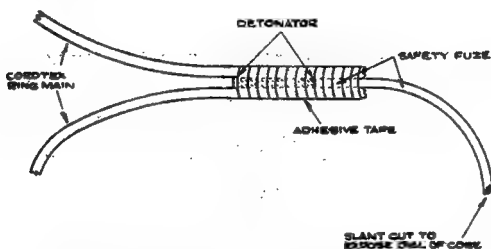


Fig 18.—Assembling detonator and safety fuze to ring main

27. With a piece of grass, measure the depth of the open end of the detonator. Cut a 4-ft length of safety fuze; make this cut square across the safety fuze. Fit the square-cut end of the safety fuze into the open end of the detonator, easing it in to the same depth as was measured with the piece of grass.

28. *Firing the charges.*—Withdraw the detachment to a safe distance. The minimum safe distance is 60 yds; during training it is 200 yds. The detachment should wear steel helmets.

29. Light the safety fuze as described in para 23 above. Walk away and join the remainder of the detachment.

30. *Misfires.*—If the charges do not fire when expected, ie, within about  $2\frac{1}{2}$  minutes after the safety fuze is lighted, no one will normally be permitted to approach the charges for at least 30 minutes. The No. 1 will then inspect the site and act as follows:—

- (a) *If the detonator has fired.*—Remove the ring main, connect a new one, preferably using cordtex from a new coil, and fit detonator and safety fuze to it.
- (b) *If the detonator has not fired.*—Carefully cut both ends of the ring main a few inches from the detonator. Connect a new detonator and safety fuze. The unfired detonator with its safety fuze and ends of cordtex must be destroyed afterwards by lashing it to a new detonator and safety fuze and lighting it.

After taking the appropriate action to remedy the fault, proceed as in para 29 above.

31. *Stores required.*—The explosive stores required to **blow one gun pit** are as follows:—

Cordtex	80 ft
Detonator	1
Safety Fuze	6 ft
PE	7 lb
Primers	7



Amdt 1/Mar/1958

## APPENDIX VI

### DISPOSAL OF SURPLUS CHARGES

#### Service charges

1. Charge 2 and 3 bags rendered surplus by the firing of cartridges at Charge 1 or Charge 2, and complete cartridges which have misfired, will be burnt by the No. 1 on the orders of the GPO.
2. The GPO will indicate to each No. 1 where charges are to be burnt. Care must be taken to see that charges are burnt in an area where the fire risk is least; ground containing peat soil will never be used.
3. The quantity of propellant (cordite) charges to be lit at any one time will not exceed forty charge bags.
4. The charge bags will be laid side by side, in contact with each other and never more than one layer deep. From the downwind end of this group of propellant a train of propellant will be laid, seven feet long, in a crosswind direction. The No. 1 will obtain propellant for this train by opening a charge bag with the aid of a magazine knife; steel knives or bayonets must not be used.
5. The train of propellant will taper down to the thickness of a single stick of propellant. If possible, W, WM or NQ propellant, which is in stick form, should be used for this purpose. If NH or FNH, which is in granular form and may be difficult to ignite, has to be used, oil soaked rags should if possible be put at the beginning of the train and where it joins the main group of propellant.
6. If no magazine knife is available, the whole train will be made of oil-soaked cotton waste or rags.
7. The No. 1 will ensure that no other person, vehicle, stores etc are within 30 yards of the propellant before lighting it.
8. The No. 1 will ignite the single stick of propellant, or the start of the oil-soaked cotton waste or rags, and keep the match in his possession until the burn has been completed.
9. In no circumstances will a propellant fire that is already burning be fed by throwing on more propellant, either loose or in bags.

10. After the burn has been completed the area should be well watered or, failing that, any smouldering bits should be well stamped out. Any sticks which may have been thrown from the train should be collected and burnt separately. The No. 1 will carefully examine the ground and ensure that all fires are extinguished.

11. 24 hours must elapse before propellant is again burnt on the same stretch of ground.

### **Blank charges**

12. Surplus blank cartridges containing gunpowder or other propellant (eg, cordite) will normally be returned to RAOC for re-use. If, however, there is a misfired cartridge (ie, the primer has fired but the propellant has not), the following drill will be used:—

(a) *Blank cartridges containing propellant (cordite).—*  
These will be burnt as detailed in paras 1 to 11 above.

(b) *Blank cartridges containing gunpowder:—*

- (i) The charges will be immersed in water, opened under water, left under water until thoroughly soaked, and then burnt. If difficulty is experienced in lighting this wet gunpowder, some of the water should be allowed to dry out. Since wet gunpowder will retain some of its explosive properties on drying, it will be destroyed immediately it has been prepared for disposal.
- (ii) Ignition will be achieved by means of a train of oil-soaked cotton waste at the end of a wet gunpowder train. The train will be seven feet long and will not contain more than ten pounds of wet gunpowder, evenly distributed.
- (iii) All safety precautions taken during the disposal of propellant will be used. The utmost care must be taken when handling gunpowder. Charge bags which have not been immersed in water should on no account be opened.
- (iv) This drill must be personally supervised by an officer.